72-

Highway Safety Literature
. . . A Bi-Monthly Abstract Journal

HSL No. 72-18 September 22, 1972 HS-011 469 - HS-011 548

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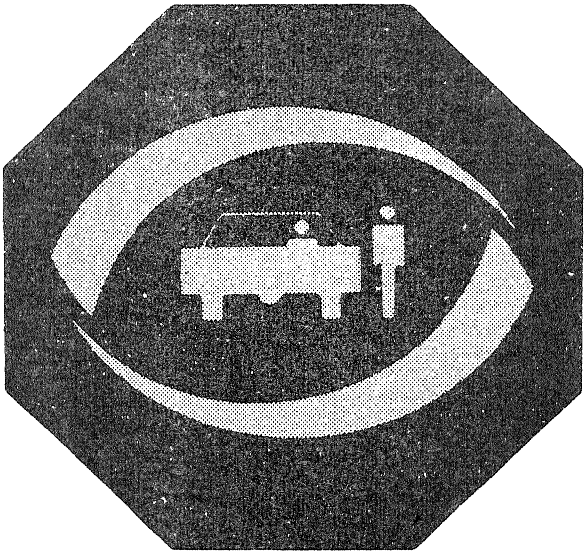
September 22, 1972



SPECIAL ANNOUNCEMENT
ON PAGE 30

THIS ISSUE CONTAINS:
HS-011 469 - HS-011 548

U.S. Department of Transportation / National Highway Traffic Safety Administration

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An Announcement of
HIGHWAY SAFETY LITERATURE
. . . A Bi-Monthly Abstract Journal

Published twice-a-month by the National Highway Traffic Safety Administration,
Research Institute, Office of Accident Investigation and Data Analysis
Washington, D.C. 20590

INTRODUCTION

Publications such as journal articles, proceedings, and research reports announced in *Highway Safety Literature* include some of the most recent additions to the collection of the NHTSA Scientific & Technical Information Service. Subject areas covered include all phases of highway, motor vehicle, and traffic safety, especially those encompassed by the National Traffic and Motor Vehicle Safety Act of 1966 and the Highway Safety Act of 1966.

Individual issues of *HSL* are numbered according to the year and the issue number within that year; thus, 72 designates the year and 1, 2, 3, etc. the individual issues. To aid the user in locating citations by the HS-number, the cover bears the inclusive entry number for each issue.

Entries in *HSL* are arranged according to the NHTSA Subject Category List shown in the Table of Contents. The list is a two-level arrangement consisting of five major subject fields subdivided into 59 subject groups. Documents related directly to the National Highway Traffic Safety Administration (NHTSA) are announced in a separate section headed NHTSA DOCUMENTS and are numbered in five distinct series: NHTSA Accident Investigation Reports (HS-600 000 series), NHTSA Compliance Test Reports (HS-610 000 series), NHTSA Contractors Reports (HS-800 000 series), NHTSA Staff Speeches, Papers, etc. (HS-810 000 series), and NHTSA Imprints (HS-820 000 series). For NHTSA DOCUMENTS in series HS-600 000 and HS-610 000, individual full case reports are available for inspection at the National Highway Traffic Safety Administration. HS-800 000 series and HS-820 000 series are available for, purchase from NTIS or GPO (see page ii). Although announced together in a separate section, these documents are also assigned specific subject categories for machine retrieval.

A document which contains a number of separate articles is announced as a complete volume in the subject category most applicable to it as a whole. Entries for the individual articles appear in their most specific subject category.

SAMPLE ENTRIES

Subject Category Array	Fld. 5/21; 5/9
NHSB Accession no	HS-800 218 Fld. 5/21; 5/9
Title of document	AN INVESTIGATION OF USED CAR SAFETY STANDARDS--SAFETY INDEX: FINAL REPORT. VOL. 6 - APPENDICES G-L
Personal author(s)	by E. N. Wells; J. P. Fitzmaurice; C. E. Guilliams; S. R. Kalin; P. D. Williams
Corporate author	Operations Research, Inc.
Collation	150p
Publication date	1969 150p Contract FH-11-6921 Report no. ORI-TR-553-Vol-6; PB-190 523
Abstract	Appendices G-L to this study of used car safety standards include: indenture model diagrams for classes I-IV motor trucks; degradation, wear, and failure data for motor truck classes I-IV; and safety index tables for classes I-IV motor trucks.

Search terms; Wear; Trucks; Failures; Used cars; Inspection standards

AVAILABILITY: NTIS

HS-004 497 Fld. 5/19

AUTO THEFT--THE PROBLEM AND THE CHALLENGE

by Thomas A. Williams, Sr.

Journal citation .... Published in *FBI Law Enforcement Bulletin* v37 n12 p15-7 (Dec 1968)

Gives figures on the extent of the auto theft problem and comments on anti-theft devices available now or in the planning stage.

Search terms: Theft; Theft protection; Stolen cars

(Note: If the date of a report or Journal article is not given, the small letters nd will appear)

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NOTE: ( ) Numbers in parentheses following certain subject groups indicate the Highway Safety Program Standards (No. 1, and up) and/or Federal Motor Vehicle Safety Standards (No. 101 and up) which may apply to these groups.

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- /1 Brake Systems (102, 105-6, 116)
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NOTE: Material published in Highway Safety Literature (HSL) is intended for the information and assistance of the motor vehicle and highway safety community. While brand names, equipment model names and identification, and companies may be mentioned from time to time, this data is included as an information service. Inclusion of this information in the HSL should not, under any circumstances, be construed as an endorsement or an approval of any particular product, course, or equipment by the U.S. Department of Transportation, National Highway Traffic Safety Administration.

Harry A. Feinberg
Managing Editor

AVAILABILITY OF DOCUMENTS AND INSTRUCTIONS FOR ORDERING

Articles and reports whose citations and abstracts appear in HSL are acquired from many sources, such as periodicals, journals, NHTSA Contractors' reports and NHTSA staff speeches, and other reports. Those reports other than NHTSA Contractors' reports and NHTSA generated reports and speeches (see introduction) are assigned a lower consecutive accession (HS-) number.

Department of Transportation personnel may borrow copies of publications announced in HSL from the NHTSA Technical Reference Division. Non-DOT Personnel, in the Washington, D.C. area, may borrow copies of publications for a 24-hour period only. Telephone (202) 426-2768. Government personnel in the Washington, D.C. area, use government ID phone 118-62768.

The names of the journals cited in HSL appear in *italic type* preceded by the words "Published in." The journal containing the article cited may be borrowed from most research and public libraries. Non-DOT personnel outside the Washington area should contact their company or agency libraries for assistance.

(Use any of the most recent *periodical directories* for location and price of publications cited in HSL)

NHTSA Contractors' reports and other reports can usually be obtained as indicated under AVAILABILITY. However, there is no certainty that copies will be available for more than a limited period after a report is issued.

The more common availability sources are identified by symbols which are explained in the next column:

NTIS: National Technical Information Service, Springfield, Va. 22151. Order by accession number: HS, AD, or PB. Prepayment is required by NTIS coupon, check or money order (made payable to NTIS). GPO coupons are not acceptable. Documents are available in paper copy (PC); in full size original or reduced facsimile, and on microfiche (MF) a 4x6" negative sheet of film (reader required).

GPO: Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402. Give corporate author, title, personal author, and report number. Prepayment is required by GPO coupon (NTIS coupons are not acceptable), check or money order (made payable to the Superintendent of Documents).

HRB: Highway Research Board, National Academy of Sciences, 2101 Constitution Ave., N. W., Washington, D. C. 20418.

NHTSA: National Highway Traffic Safety Administration, General Services Division, Washington, D.C. 20591 (Telephone (202) 426-0874), Give HS-No.

SAE: Society of Automotive Engineers, Dept. HSL, 2 Pennsylvania Plaza, New York, N.Y. 10001. Order by SAE report numbers. Prices given are list; discounts are available to SAE members and sometimes to libraries and U.S. Government Agencies. Prepayment is required; orders received without payment are subject to a $1 handling charge.

IMPORTANT NOTICE

WHEN REQUESTING a document, to be absolutely sure you receive what you order, give the accession number (HS, PB, AD number) or report number (in cases such as an SAE document), title of report, and the personal or corporate author (whichever is cited). When requesting an HS-numbered document from NTIS, add DOT/to the prefix HS-; example HS-800 000 should be ordered as DOT/HS-800 000.

1/0 ACCIDENTS

1/1 Emergency Services

HS-011 469 Fld. 1/1

EMERGENCY

by Virginia Wayland

Published in *Highway User* p4-7, 30 (Jan 1972)

The inadequacies of emergency medical services in most cities are discussed. Jacksonville, Florida, has perhaps the best ambulance service in the country. Traffic accidents in Jacksonville from 1968 to 1971 have risen 31% but the death rate from crashes has dropped 35%. Credit is given to the emergency medical ambulance service, whose services, communication system, and medical training of ambulance personnel are discussed.

Search terms: Emergency medical services; Transportation of injured; Ambulance personnel training; Firemen; First aid; Fatality rates; Jacksonville

HS-011 470 Fld. 1/1

ROAD ACCIDENT RESCUE TECHNIQUES

by R. Snook

Published in *Medical and Biological Illustration* v21 p66-72 (Apr 1971)

9refs

Cooperation among firemen, police, ambulance drivers, and physicians in Bath, England is described. Rescue equipment for trapped and injured occupants is discussed. Feedback regarding the patient's final diagnosis, treatment, and recovery can contribute to the training of ambulance drivers.

Search terms: Occupant rescue; Ambulance personnel training; Police; Escape from vehicle; First aid equipment; Bath (England); Emergency medical services; Firemen; Physicians; Emergency equipment; Resuscitation

1/2 Injuries

HS-011 471 Fld. 1/2; 1/1

EVALUATION OF THE MANAGEMENT OF VEHICULAR FATALITIES SECONDARY TO ABDOMINAL INJURY

by Harold R. Gertner, Jr.; Susan P. Baker; Robert B. Rutherford; Werner U. Spitz

Published in *Journal of Trauma* v12 n5 p425-31 (May 1972)

11refs

Presented at the 14th Annual Conference, American Association for Automotive Medicine, Ann Arbor, 19-20 Nov 1970.

The adequacy of hospital care received in Baltimore by 33 drivers, passengers, and pedestrians who died following isolated abdominal injury was investigated. The reviewing surgeons estimated that half of these lives might possibly have been salvaged by prompt and proper diagnosis and treatment. The investigation suggests that there is much room for improvement even in basic principles of managing the injured. Over one third of the cases showed a need for more aggressive treatment of patients in shock. Nearly half involved either failure to operate or excessive delay in operation, despite symptoms of abdominal injury. It appears that more improvement is needed in hospitals which treat the smallest number of highway injuries than in hospitals where the staff is attuned to problems of acute trauma.

Search terms: Abdominal injuries; Fatalities; Fatality causes; Transportation of injured; Autopsies; Baltimore; Accident survivability; Surgery; Emergency medical services; Hospitals; Shock (pathology); Diagnosis; Medical treatment

HS-011 472 Fld. 1/2; 3/2

FLEXURE OF LAYERED CRANIAL BONE

by R.P. Hubbard

Published in *Journal of Biomechanics* v4 n4 p251-63 (July 1971)

8refs

The present study is an important step in understanding the brain case as a structure. Beams taken from the layered regions of embalmed calvaria were repeatedly tested in three-point bending at various span lengths to determine the resistance of layered cranial bone to bending and shearing deflection. These beams were also strain gauged and loaded to failure in four-point bending to study the failure response of cranial bone. The layered beam theory was found to provide a valid relationship between the constituent material properties and structural geometry of layered cranial bone and its flexural response.

Search terms: Injury research; Skull; Stress measurement; Loading tests; Deformation; Deflection; Head impact tolerances; Cadavers in testing; Strain gauges; Shear modulus; Bending; Mathematical models; Bone mechanical properties; Bone physical properties; Regression analysis; Stiffness

HS-011 473 Fld. 1/2; 5/11

CALIFORNIA PROBES SINGLE-CAR ACCIDENT FATALITIES

Published in *Journal of American Insurance* v48 n1 p28-30 (Jan/Feb 1972)

A study of 409 crashes by the California Highway Patrol showed that mechanical defects caused or contributed to 18% of

1/2 Injuries (Cont'd.)

HS-011 473 (Cont'd.)

single vehicle deaths. The study also observed that almost all of the mechanical defects were attributed to wear and lack of maintenance. The most commonly observed mechanical defect was in the braking system which accounted for 35% of all defects found. Next most common were steering system defects, which accounted for 26%. Older vehicles tend to be overinvolved in mechanically defective crashes. The roles of the highway and the driver, particularly the drinking driver, are briefly noted.

Search terms: Single vehicle accidents; Fatalities; Automobile defects; Defective vehicles; Accident causes; Highway characteristics; Drinking drivers; Vehicle age

1/3 Investigation

HS-011 474 Fld. 1/3

MOTOR CARRIER ACCIDENT INVESTIGATION. HARRY L. YOUNG AND SONS, INC. AND ROY E. MONTGOMERY TRUCKING, ACCIDENT, JANUARY 19, 1971, NAMPA, IDAHO

Bureau of Motor Carrier Safety

1971 9p
Report no. 71-2

A tractor semitrailer carrying steel overtook and collided with the rear of a cattle truck. The load shifted on the steel truck, tilting the cab forward. The driver was ejected and seriously injured. This driver was inattentive or dozing. The co-driver received minor injuries. Property damage amounted to $20,000.

Search terms: Tractor semitrailers; Rear end collisions; Driver fatigue; Accident case reports; Accident investigation; Truck accidents; Accident causes; Injury severity; Load shifting; Property damage accidents; Idaho

1/4 Locations

HS-011 475 Fld. 1/4

TRAFFIC SAFETY STUDIES IN SMALLER COMMUNITIES

by P.C. Box

Published in *Public Works* v102 n3 p51-3, 81 (Dec 1971)

5refs

The establishment of location-type files is recommended to establish expected numbers of accidents as related to various kinds of routes or types of accidents; to identify locations having higher rates than the expected average; to isolate patterns of accidents that can be corrected by traffic engineering efforts; to compare needs among different locations in order to assign priorities; and to perform before and after studies. Findings from safety studies in several small cities are tabulated. The percentages of total accidents involving major routes range from 56 to 85. From 44 to 61% of accidents in the smaller cities involved intersections.

Search terms: Accident risk forecasting; Accident location; Intersection collisions; Small cities; Accident rates; Accident types; Priorities; Traffic engineering; Accident records

1/5 Statistical data

HS-011 476 Fld. 1/5

UTAH, WASATCH FRONT COUNTIES (WEBER, DAVIS, SALT LAKE AND UTAH) TRAFFIC ACCIDENTS BY TYPE AND ACCIDENT RATE, 1970

Utah State Dept. of Highways

1971 202p

In cooperation with Federal Highway Administration.

Statistics of motor vehicle accidents for Federal-aid and State designated highways are presented. The accident rates are expressed by frequency of accidents in relation to type, time, traffic volume, and location.

Search terms: Utah; Accident statistics; Accident rates; Head on collisions; Rear end collisions; Side impact collisions; Vehicle fixed object collisions; Injuries by accident type; Fatality rates; Property damage accidents; Injury statistics; Traffic volume; Time of accidents; Accident types; Accident location; Ran off road accidents; Rollover accidents

HS-011 477 Fld. 1/5

THE ANALYSIS OF MOTOR VEHICLE ACCIDENT COSTS IN THE STATE OF OHIO

by L. Titan, comp.

Ohio State Univ.

1970 96p 9refs

Prepared for the Ohio Department of Highways in cooperation with the Bureau of Public Roads.

Detailed information of in-state traffic accident involvements and costs related to a wide range of variables with regard to the highway, the vehicle, the driver, and the general environment was obtained for the year 1961. Information on involvements and costs of in-state and out-of-state traffic and non-traffic accidents and incidents for passenger car and truck involvements are classified by severity of the accident or incident.

Search terms: Accident costs; Truck accidents; Injury costs; Economic analysis; Accident statistics; Fatalities by age; Injuries by age; Fatalities by sex; Injuries by sex; Accident severity; Intersection collisions; Highway characteristics; Automobile accidents; Damage severity; Time of accidents; Unreported accidents; Ohio; Injury by seat occupation; Accident types; Property damage accidents; Fatality rates; Accident rates; Injury rates; Urban accidents; Rural accidents; Injury severity; Age factor in accidents; Driver age; Driver sex; Sex factor in accidents; Driver occupation; Multiple vehicle accidents

HS-011 478 Fld. 1/5

A COMPARISON OF FIVE TECHNIQUES OF MEASURING ROAD ACCIDENT EXPERIENCE

by L. Greenberg

Published in *Journal of Safety Research* v3 n4 p167-75 (Dec 1971)

9refs

Using the accident-experience learning curve (Model C), a test was made as to whether the number of accidents per unit of mileage traveled would decrease as cumulative mileage increased. Other models were: number of accidents per unit of mileage related to year of occurrence (model A); number of accidents per vehicle volume, also related to year of occurrence (model B); number of accidents per vehicle volume, related to average distance traveled (model D); and a hyperbolic relationship between number of accidents per vehicle volume and cumulative miles (model E). The results indicated that an accident-experience learning curve phenomenon does exist. Models C and E proved superior to the remaining three.

> Search terms: Accident rates; Traffic volume; Vehicle mileage; Accident risk forecasting; Regression analysis; Accident risks; Variables; Correlation analysis

2/0 HIGHWAY SAFETY

HS-011 479 Fld. 2/0

TRAFFIC SAFETY IN MICHIGAN, A PROGRESS REPORT

by John R. Plants; Noel C. Bufe

Michigan State Police

1970 ? 27p

Michigan's programs for meeting the 16 national standards for highway safety are briefly discussed.

> Search terms: Safety standards compliance; Highway safety programs; Michigan; Highway safety standards

2/7 Meteorological Conditions

HS-011 480 Fld. 2/7

MOTOR VEHICLE NOISE GENERATION AND POTENTIAL ABATEMENT

by R.L. Paullin; H.B. Safeer

Department of Transp.

1972 9p 12refs
Report no. SAE-720273

> Presented at Automotive Engineering Congress, Detroit, 10-14 Jan 1972.

In May 1969, a study on the magnitude of the transportation noise problem and its potential abatement was initiated. Four computer simulation models were used to establish the noise levels which might be expected for different transportation modes as a function of the traffic characteristics peculiar to that mode. The need for government standards and regulations was reviewed as was the need for additional research and development of successful means for reducing noise.

> Search terms: Vehicle noise; Traffic noise; Noise control; Computerized simulation; Traffic surveys; Acoustic measurement; Connecticut; Highway characteristics; Vehicle characteristics; Automobile models; Traffic density

AVAILABILITY: SAE

HS-011 481 Fld. 2/7

NOISE SOURCE DEFINITION—EXTERIOR PASSENGER VEHICLE NOISE

by R.J. Vargovick

Ford Motor Co.

1972 7p 10refs
Report no. SAE-720274

> Presented at Automotive Engineering Congress, Detroit, 10-14 Jan 1972.

A drive-by exterior noise program was conducted to determine the contribution of each car noise source—engine/exhaust, fan, and tire/roadway—to the total exterior drive-by noise of a passenger vehicle. A 1970 high- and low-power sedan and a 1970 high- and low-power sporty compact were utilized in the test sequence. Results indicate for cruise (road-load) conditions that: except for high-performance vehicles, the predominant source of exterior vehicle noise above 500 Hz is tire/roadway noise; the major sources of exterior noise below 500 Hz are both engine/exhaust noise and tire/roadway noise; fan noise is an insignificant contributor to passenger vehicle exterior noise at present noise levels.

> Search terms: Tire noise; Exhaust noise; Engine noise; Fan noise; Acoustic measurement; Cruising; High speed; Compact automobiles; High powered automobiles; Noise standards

AVAILABILITY: SAE

HS-011 482 Fld. 2/7

MEASUREMENT OF AUTOMOTIVE PASSBY NOISE

by R.K. Hillquist; R.A. Bettis

General Motors Proving Ground

1972 12p 4refs
Report no. SAE-720275

2/7 Meteorological Conditions (Cont'd.)

HS-011 482 (Cont'd.)

Presented at Automotive Engineering Congress, Detroit, 10-14 Jan 1972.

SAE procedures for measurement of noise emitted by trucks, buses, and passenger cars are reviewed. Recent studies into test parameters such as site, ambient weather conditions, vehicle operator, and nominally identical vehicles indicate that significant variations in test results can occur. These results suggest that the present procedures and their provisions should be revised to eliminate the sensitivity of test results to variations in these parameters.

Search terms: Noise standards; Acoustic measurement; Vehicle noise; Weather; Human factors; Environmental factors; Ambient temperatures; Wind forces; Parameters; Reliability

AVAILABILITY: SAE

2/9 Traffic Control

HS-011 483 Fld. 2/9

EVALUATION OF THE OPERATING CONDITIONS ON A DETROIT DUAL-MODE VEHICLE NETWORK

by Robert G. Stefanek; Stephen J. Kiselewich

Ford Motor Co.

1972 10p 9refs
Report no. SAE-720272

Presented at Automotive Engineering Congress, Detroit, 10-14 Jan 1972.

A methodology is developed by which the efficiency of the cycle preprogramming strategy in managing traffic in a large network can be studied. The methodology is used to analyze the operating conditions on an automated network for the Detroit area.

Search terms: Automatic highways; Guideway systems; Automatic traffic control; Access control; Traffic management; Dual mode vehicles; Detroit; Traffic volume; Traffic capacity; Traffic density; Urban traffic flow

AVAILABILITY: SAE

HS-011 484 Fld. 2/9

THE NEW LOOK IN TRAFFIC CONTROL DEVICES

by Woodrow W. Rankin

Published in *Highway User* p8-11 (Jan 1972)

The expanded use of symbols on U. S. road signs will facilitate driver communication and recognition. In addition, familiarity with symbol signs will help U. S. drivers travelling in other countries as well as foreign visitors in this country. An important change that will be seen as symbols replace some words will be the use of the international red circle and slash as the symbol for no.

Search terms: Traffic control devices; Pavement markings; Sign colors; Sign legibility; Sign recognition; Sign shape; Traffic signs; Highway signs; Warning signs; Sign effectiveness; Sign design; Sign visibility

3/0 HUMAN FACTORS

HS-011 485 Fld. 3/0

DOCTORS EXAMINE THE HIGHWAY DISEASE

Anonymous

Published in *Journal of American Insurance* v48 n1 p5-8 (Jan/Feb 1972)

The activities of three medical organizations dedicated to reducing the highway toll are described. The approaches of Physicians for Automotive Safety, the American Association for Automotive Medicine and the American Medical Association's Committee on Medical Aspects of Automotive Safety include original research, patient counseling, medical and psychological treatment, as well as public education programs and political lobbying. The problem of automotive safety for children is mentioned.

Search terms: Public information programs; Safety education; Physicians and highway safety; Child safety; Highway safety programs

3/1 Alcohol

HS-011 486 Fld. 3/1

BLOOD AND URINE ALCOHOL TESTING IN THE PUBLIC HEALTH LABORATORY

by R. H. Laessig; S. L. Inhorn; B. J. Basteyns; R. V. Becker

Published in *Health Laboratory Science* v8 n3 p119-27 (Jul 1971)

4refs

Presented at the ninety-eighth annual meeting, American Public Health Assoc., Houston, 28 Oct 1970.

The activities of the State Laboratory of Hygiene and State Division of Health in Wisconsin in relation to two programs in alcohol and traffic safety are discussed. One program, organized through the coroners of the state, investigates blood alcohol levels in traffic fatalities to document the extent of alcohol involvement. A second program considers the public health laboratory and its response to the development, enactment, and implementation of implied consent legislation. Results of tests performed in Wisconsin for certification, evaluation, and actual implied consent tests on drivers are discussed.

Search terms: Alcohol blood tests; Urine alcohol levels; Driver fatalities; Implied consent laws; Wisconsin;

Laboratory tests; Blood alcohol levels; Drinking drivers; Driver intoxication

HS-011 487 Fld. 3/1

BLOOD ALCOHOL TESTING PROGRAM IN FLORIDA

by F. R. Usher, Jr.; N. J. Schneider

Published in *Health Laboratory Science* v8 n3 p128-30 (Jul 1971)

Presented at the ninety-eighth annual meeting of the American Public Health Assoc., Houston, 28 Oct 1970.

The implied consent law which became effective in Florida January 1, 1968, is discussed. Four methods have been approved for testing blood specimens for alcohol content–microdiffusion, gas chromatography, alcohol dehydrogenase, and oxidation of distillate with potassium dichromate. The program is too young to provide data regarding the results.

Search terms: Alcohol blood tests; Implied consent laws; Drinking drivers; Blood alcohol levels; Alcohol breath tests; Breathalyzers; Florida; Driver intoxication; Laboratory tests

HS-011 488 Fld. 3/1

CHEMICAL TESTING FOR ALCOHOL IN ROAD ACCIDENTS

by Norman E. W. McCallum

Published in *Medical Journal of Australia* v1 p1025-9 (8 May 1971)

4refs

Based on lectures at Australian Medical Association Tasmanian Branch 44th annual Postgraduate Weekend, Launceston, 16-17 Oct 1970.

The development of chemical tests to aid the legal assessment of the degree of impairment caused by alcohol in drivers, and some of the circumstances found to be commonly associated with these legal cases, are discussed. A comparison is made of the blood alcohol concentrations of some 2,500 drivers in Victoria before the 0.05% limiting legislation was enacted, with a similar number of drivers after this legislation was introduced. Reasons for the changes in these two sets of recorded results are discussed.

Search terms: Alcohol chemical tests; Alcohol blood tests; Alcohol laws; Alcohol breath tests; Victoria (Australia); Blood alcohol levels; Drinking drivers

HS-011 489 Fld. 3/1

ALCOHOLISM IN A PROBLEM DRIVER GROUP: A FIELD TRIAL OF THE MICHIGAN ALCOHOLISM SCREENING TEST (MAST)

by M. L. Selzer; F. E. Vanosdall; M. Chapman

Published in *Journal of Safety Research* v3 n4 p176-81 (Dec 1971)

11refs

The MAST was administered to a group of 838 problem drivers undergoing driver improvement interviews. The problem driver group was strikingly male (95%) and young with 53% under 24 years of age. The MAST revealed that 21% of the problem driver group scored in an alcoholic or probably alcoholic range. No less than 25% of the problem drivers had at least one conviction for driving under the influence of liquor or for drunk and disorderly behavior. MAST scores for previously convicted drivers indicated that 60% were alcoholic or probably alcoholic. The test appeared to be an effective instrument for screening out alcoholics in problem driver groups.

Search terms: Drinking drivers; Young adult drivers; Male drivers; Problem drivers; Convictions; Michigan Alcoholism Screening Test; Alcoholism; Driver interviews; Traffic law violators; Driver psychological tests; Driver criminal history; Adolescent drivers

HS-011 490 Fld. 3/1; 3/12

INFLUENCE OF ALCOHOL ON VESTIBULAR RESPONSES TO ANGULAR ACCELERATIONS

by D. J. Schroeder

Published in *Aerospace Medicine* v42 p959-70 (Sep 1971)

27refs

The effect of alcohol ingestion on both vertigo and nystagmic responses to angular stimulation was investigated. Responses were obtained with and without visual fixation, and with alertness of the subjects controlled. When recorded in total darkness, the nystagmic reaction to rotatory stimulation was suppressed by the alcohol. When visual fixation was allowed, a high-frequency, low-amplitude nystagmus to rotation was obtained following alcohol ingestion; there was little or no response prior to drinking. This apparent enhancement of the response was not due to an increase in vestibular sensitivity but, rather, to the suppressive effects of alcohol on the ability of the subject to maintain adequate visual fixation. Vertigo sensations resulting from the rotatory stimuli evidenced only slight declines following alcohol ingestion.

Search terms: Alcohol effects; Alcohol effect on vision; Vestibular apparatus; Vertigo; Nystagmus; Angular acceleration; Eye movements; Blood alcohol levels; Visual behavior; Laboratory tests; Reaction time; Attention; Displacement; Statistical analysis

3/2 Anthropomorphic Data

HS-011 491 Fld. 3/2

STRESS DISTRIBUTION IN LUNGS: A MODEL OF PULMONARY ELASTICITY

by J. Mead; T. Takishima; D. Leith

Published in *Journal of Applied Physiology* v28 n5 p596-608 (May 1970)

3/2 Anthropomorphic Data (Cont'd.)

HS-011 491 (Cont'd.)

18refs

Although lungs are exposed to transpulmonary pressure, the air spaces within are distended solely by forces applied from surrounding tissues. In uniformly expanded lungs this pressure probably approximates transpulmonary pressure. In non-uniformly expanded lungs the effective distending pressure differs from transpulmonary pressure, and in the appropriate sign to reduce the non-uniformity. This interdependence of airspace distention bears on a number of aspects of pulmonary function, including the size of air spaces which may be expanded from the gas-free state, the static and dynamic stability of air spaces, the dryness of air spaces, the forces distending airways and blood vessels within lungs, and the distribution of pulmonary edema.

Search terms: Lung capacity; Lungs; Stress (physiology); Elasticity; Mathematical models; Air pressure; Stress analysis; Air flow

3/4 Driver Behavior

HS-011 492 Fld. 3/4

JUDGMENT OF VEHICLE SPEEDS AND TRAFFIC PATTERNS: PHASE 3. INTERIM REPORT

by H. W. Case; S. F. Hulbert

California Univ. ITTE

1970 44p 14refs
Report no. UCLA-ENG-7093; PB-196 403

Sponsored by California Div. of Highways and Federal Hwy. Administration.

Seventy-four subjects' speed estimations, traffic pattern, and passing judgments from 16 mm motion pictures indicate a high positive correlation between tests and retests of speed estimations on a freeway, but little correlation between speed estimations on freeway versus rural roads. Compared to real speeds, there is consistent overestimation of speed from films taken on freeways and underestimation of speed from films on rural roads. There is no correlation between speed estimations and judgments of traffic patterns or passing. The subjects tend not to pass where legality or distance is questionable. A positive influence of posted no passing zone signs is indicated.

Search terms: Speed studies; Passing; Freeway driving; Rural roads; Driving simulation; Young adult drivers; Driver behavior research; Driving task analysis; Velocity perception; Motion perception; Traffic characteristics; No passing zones; Distance perception; Correlation analysis; Gap acceptance

AVAILABILITY: NTIS as PB-196 403

3/5 Driver Education

HS-011 493 Fld. 3/5

THE RELEVANCE OF SAFETY EDUCATION IN SCHOOLS OF TOMORROW

by Paul H. Blaisdell

Published in *Journal of Traffic Safety Education* v19 n2 p9-11 (Jan 1972)

Excerpted from the Graham Memorial Lecture at the National Safety Congress, 25 Oct 1971.

There is a definite weakening of state standards for driver education, which not only imperils the whole driver education structure but imperils the more favorable insurance rates for drivers trained in standard courses. Driver education has not kept pace with the times. It has remained more or less static for the last 10 or 15 years. The impetus for a new driver education program should come from the safety educators themselves. Driver education cannot await a protracted period of research study. It could well disappear from the school scene unless it is revitalized without delay.

Search terms: Driver education; High school driving courses; Safety education

HS-011 494 Fld. 3/5

A DRIVER EDUCATION CURRICULUM FOR THE 70'S

by Francis C. Kenel

Published in *Journal of Traffic Safety Education* v19 n2 p18-20 (Jan 1972)

Excerpts from Keynote Address at 15th annual ADTSEA Conference, Springfield, Ill., 9 Aug 1971.

Major attention in a driver education course must be placed on the identification and avoidance of hazardous situations, with additional emphasis placed on the recognition of systems failures and methods of coping with critical incidents up to and including alternate collision courses which will hopefully minimize consequences of such failures. The curriculum requirements and evaluation, performance criteria, and strategy for implementation are discussed.

Search terms: Driver education; Curricula; Driver skills; Defensive driving

HS-011 495 Fld. 3/5

REPORT TO THE GOVERNOR OF MARYLAND BY THE TASK FORCE TO STUDY THE DRIVER EDUCATION PROGRAM IN MARYLAND

Maryland State Motor Vehicle Administration

1971 20p

ve basic problem areas in driver educa- n are reviewed: program cost, fund- , availability, uniformity, and evalua- n and reimbursement. Recommenda- ns include the use of para-profes- nals as part of the cost reduction fort, realignment of source finances in e funding proposal, creation of a ngle-agency concept through joint ponsibility for promulgation of rules d regulations, and establishment of a mbursement system for all schools.

Search terms: Driver education; Driver education costs; Driver education eval- uation; Maryland; High school driving courses

S-011 496 Fld. 3/5

EW STEPS IN DRIVER EDUCA- ON

Allen Robinson

blished in *Highway User* p16-9 (Jan 72)

e development of high school driver ucation programs is discussed. Criti- m of earlier programs provided the petus to improve the curriculum. provement of the driver education rriculum has been accompanied by the velopment of strong support programs ong governmental agencies.

Search terms: Driver education; Driver education evaluation; High school driving courses

S-011 497 Fld. 3/5; 3/4

N ABSTRACT OF THE EFFEC- IVENESS OF A UNIFORM RAFFIC SCHOOL CURRIC- LUM FOR NEGLIGENT RIVERS

R. M. Harano; R. C. Peck

alifornia Dept. of Motor Vehicles

971 15p 5refs
ontract HPR-1 (4) B0205
eport no. 37-Abs

For abstract and search terms, see HS-011 498 that follows.

HS-011 498 Fld. 3/5; 3/4

THE EFFECTIVENESS OF A UNIFORM TRAFFIC SCHOOL CURRICULUM FOR NEGLIGENT DRIVERS

by R. M. Harano; R. C. Peck

California Dept. of Motor Vehicles

1971 48p 20refs
Contract HPR-1(4)-B0205
Report no. 37

For male drivers, the Uniform Driver Improvement School (UDIS) resulted in an 11.8% reduction in accidents and a 6.2% reduction in convictions. However, the effectiveness of the UDIS was found to vary with the type of driver treated. The subject's prior driving record, age, and sex were factors in post UDIS accident reduction. UDIS showed lower accident and conviction means compared with regular school programs. Questionnaire responses indicated that UDIS males had a more favorable attitude toward traffic school as a form of disciplinary action than controls not attending traffic school. Cost effectiveness of UDIS might be improved with changes in three areas: course length, course content, and target population.

Search terms: Driver improvement schools; Problem drivers; Driver records; Male drivers; Female drivers; Statistical analysis; Questionnaires; Curricula; Driver age; Marital status; Traffic law violators; California; Driver education evaluation; Benefit cost analysis

3/8 Environment Effects

HS-011 499 Fld. 3/8

MOTOR VEHICLE NOISE–IDENTIFICATION AND ANALYSIS OF SITUATIONS CONTRIBUTING TO ANNOYANCE

by William J. Galloway; Glenn Jones

Bolt, Beranek and Newman, Inc.

1972 16p 10refs
Report no. SAE-720276

Sponsored by the Automobile Manufacturers Association. Presented at Automotive Engineering Congress, Detroit, 10-14 Jan 1972.

A telephone interview survey of 1,200 respondents in three cities (Boston, Detroit, Los Angeles) identified 12 vehicle type/noise source/operating mode situations causing various degrees of annoyance. Each situation was assigned to one of three categories of annoyance sensitivity depending upon the attitudinal factors related to the source. Each category had a linear relationship between noise intensity and annoyance. Noise measurements indicated that the respondent, in general, properly identified the types and magnitudes of noise sources found at their sites.

Search terms: Noise tolerances; Noise exposure; Vehicle noise; Aircraft noise; Opinion polls; Acoustic measurement; Traffic noise; Interviews; Sound intensity; Boston; Detroit; Los Angeles

AVAILABILITY: SAE

4/0 OTHER SAFETY-RELATED AREAS

4/3 Cost Effectiveness

HS-011 500 Fld. 4/3; 4/7

MATHEMATICAL EVALUATION FOR CONTROLLING HAZARDS

by W. T. Fine

Published in *Journal of Safety Research* v3 n4 p157-66 (Dec 1971)

Two significant needs have been recognized in order to control hazards for the purpose of accident prevention. One is the need for a method to determine the

4/3 Cost Effectiveness (Cont'd.)

HS-011 500 (Cont'd.)

relative seriousness of all hazards for guidance in assigning priorities to preventive effort. The second is for a method to measure the justification of the estimated cost of the corrective action. A formula that calculates the risk of a hazardous situation and gives a numerical evaluation to the urgency for remedial attention is given. Calculated risk scores are then used to establish priorities. An additional formula weighs the estimated cost and effectiveness of corrective action.

Search terms: Accident prevention; Probability theory; Accident risk forecasting; Accident risks; Priorities; Benefit cost analysis; Mathematical analysis

4/5 Information Technology

HS-011 501 Fld. 4/5; 4/8

COMPUTER MODELS FOR DESIGNING DIAL-A-RIDE SYSTEMS

by F. J. Mason; J. R. Mumford

Ford Motor Co.

1972 16p
Report no. SAE-720216

Presented at Automotive Engineering Congress, Detroit, 10-14 Jan 1972.

Dial-A-Ride is a form of public transportation in which door to door service is provided with a fleet of small vehicles operating in a shared riding mode. A Dial-A-Ride system design methodology has been developed, a task which has revealed the nature of the modeling process for complex transportation systems. Several stages in the modeling process are identified. The analyst's knowledge of the system, his information needs, and the modeling technique chosen to satisfy these needs are described for each stage. A city for which Dial-A-Ride has been proposed is analyzed to illustrate each stage in the design methodology.

Search terms: Door to door transportation; Mathematical models; Demand scheduled buses; Simulation models; Travel time; Trip distribution models; Computerized simulation; Demand responsive transportation systems; Information modeling

AVAILABILITY: SAE

4/8 Transportation Systems

HS-011 502 Fld. 4/8

AUTOMATED ROADWAY TRANSPORTATION SYSTEM CONFIGURATIONS

by G. E. Wanttaja

General Motors Res. Labs.

1972 12p 4refs
Report no. SAE-720269

Presented at Automotive Engineering Congress, Detroit, 10-14 Jan 1972.

The Metro Guideway transportation system concept makes use of a common automated roadway and an integrated multimode system of automated roadway and an integrated multimode system of automatically controlled vehicles for public and personal private transportation, and goods movement. The objectives for the multimodal system concept are reviewed and a methodology is presented for system evaluation from the perspective of user costs and benefits and non-user impacts.

Search terms: Automatic vehicles; Automatic highways; Remote controlled automobiles; Guideway systems; Public transportation; Freight transportation; Automatic routing; Automatic transportation systems; Travel modes

AVAILABILITY: SAE

HS-011 503 Fld. 4/8; 4/3

DIAL-A-BUS FOR A UNIVERSITY: DEMAND RESPONSE SERVICE IN A MANY-TO-ONE ENVIRONMENT

by J. E. Gibson; R. A. White

Oakland Univ.

1972 7p 10refs
Report no. SAE-720217

Presented at Automotive Engineering Congress, Detroit, 10-14 Jan 1972.

The feasibility of a demand responsive bus system for Oakland University is analyzed. The University is primarily a commuter institution with almost 100% of its 5,000 commuter students traveling to the campus in personal automobiles. There is no form of public transportation serving the University, except the personal taxi. Oakland's policy is to construct parking lots to accommodate the high commuter volume. Based on an analysis of potential demand and a transportation simulation, the University should implement a four-bus system to link Oakland with the Rochester community. Each 12-passenger vehicle would be flexibly routed on demand within a quadrant of the Rochester community. Cost comparison for passengers and cost savings to the University are given.

Search terms: Door to door transportation; Demand scheduled buses; Student parking; Oakland Univ.; Transportation system costs; Commuting costs; Economic analysis; Financing

AVAILABILITY: SAE

-011 504 Fld. 4/8; 4/7

CASE STUDY OF THE ECO-
OMIC FEASIBILITY OF A DE-
AND-RESPONSIVE TRANS-
RTATION SYSTEM

T. F. Golob; R. L. Gustafson

neral Motors Res. Labs.

72 19p 21refs
port no. SAE-720219

Presented at Automotive Engineering Congress, Detroit, 10-14 Jan 1972.

analysis of the economic feasibility
a demand-responsive transportation
stem employing driver-operated vehi-
s on existing street networks is pre-
nted. The system is designed to meet
e general public transportation needs
a suburban community. Cost models
ecifically applicable to a transporta-
on service with demand-responsive
tributes are formulated to calculate the
stem supply functions, and an attitudi-
l survey is employed to generate esti-
ates of demand in the case study
mmunity. The demand and supply
uilibrium situations are investigated
th respect to funding alternatives and
nsitivity to changes in supply and de-
and variables.

Search terms: Economic analysis; Consumer attitudes; Questionnaires; Vehicle operating costs; Mathematical models; Demand responsive transportation systems; Feasibility studies; Suburban areas; Public transportation costs; Trip distribution models

VAILABILITY: SAE

5/0 VEHICLE SAFETY

/1 Brake Systems

IS-011 505 Fld. 5/1

NTI-LOCKING BRAKE SYSTEMS FOR ROAD VEHICLES. A URVEY OF THE STATE OF DEVELOPMENT IN SEPTEMBER 1971

by M. S. Robinson

Published in *MIRA Bulletin* n4 p9-18 (Oct Dec 1971)

15refs

An international survey is presented of the anti-locking brake systems in use, their state of commercial and technical development, and legislation affecting their use. Governmental interest in anti-locking devices appears to be centered on devices sensing wheel deceleration.

Search terms: Antilocking devices; Brake systems; Air brakes; Trailer brakes; Brake design; Brake laws; Reviews; Deceleration detection; Sensors; Electronic monitoring systems; Brake proportioner systems; Wheel locking; Antiskid devices; State of the art studies; International factors

5/3 Cycles

HS-011 506 Fld. 5/3; 3/3

GUIDE TO SAFE MOTORCYCLING

by LeRoy Dunn; Earl Allgaier

American Automobile Assoc.

1970 48p

This practical manual for motorcyclists includes information on: purchasing a motorcycle, legal requirements, safety equipment, how to operate in traffic, special hazards and how to avoid them, maintenance for greater economy, and accident rates. The fatality rate for motorcycles is five times that of cars.

Search terms: Motorcycle safety; Motorcycle characteristics; Motorcycle handling; Motorcycle inspection; Motorcycle laws; Motorcycle maintenance; Motorcycle riding techniques; Accident rates; State laws; Fatality rates

5/4 Design

HS-011 507 Fld. 5/4

DESIGN FOR SURVIVAL

Anonymous

Published in *Automotive Fleet* v11 n4 p24-7 (Feb 1972)

The thrust of the ESV (Experimental Safety Vehicle) program is in terms of crashworthiness, of the ability of the car's occupants to survive. The standards are impressive: survivability of passengers in 50 mph front and rear end collisions, with solid barriers, adequate protection for occupants to survive a 70 mph rollover, side protection to withstand 30 mph collisions, no damage to the body of the car in frontal or rear collisions up to 10 mph. The two major contractors in the program are Fairchild Industries Republic Division and AMF Inc.

Search terms: Safety cars; Experimental vehicles; Crashworthiness; Safety design; Accident survivability; Crashworthy bodies; Occupant protection; Impact protection

HS-011 508 Fld. 5/4

APPLICATION OF LEAD-VINYL NOISE BARRIERS IN TRANSPORTATION EQUIPMENT

by Charles L. Meteer

Ferro Corp.

1972 8p 4refs
Report no. SAE-720222

Presented at Automotive Engineering Congress, Detroit, 10-14 Jan 1972.

Lead vinyl coated fabrics, new composite vinyl films, and molding compounds have been developed that have application as flexible sound barriers in transportation and recreational equipment. The material consisting of fine

5/4 Design (Cont'd.)

HS-011 508 (Cont'd.)

lead particles disbursed in PVC compounds for coating, casting films, extrusion, injection molding, thermal form sheets, and rotational casting combines the high mass of lead and the properties and formability of vinyl. These composites provide a limp high mass sound barrier material.

Search terms: Noise control; Vinyl resins; Foams; Lead; Composite materials; Sound absorbing materials; Noise

HS-011 509 Fld. 5/4

COMPUTERIZED ENERGY DISTRIBUTION AND AUTOMATED CONTROL

by P. W. Sognefest; R. L. Anderson; B. E. Estes, 3rd; R. G. Nedbal

Essex International, Inc.

1972 8p
Report no. SAE-720283

Presented at Automotive Engineering Congress, Detroit, 10-14 Jan 1972.

The control system is comprised of a central computer with a digital multiplexing system. The subsystems of the car that were tested include fuel injection, ignition, power assist, comfort, and lighting. In its final form this system will make decisions for all the subsystems on the automobile, such as antiskid braking, gear selection, automatic speed control, and driver displays. The system will evolve onto the car in pieces such as engine control, lighting, and automatic temperature control. As economic factors dictate, the components will evolve into a single computerized system. The automatic temperature control system is economical today. The central computer will be economical for certain functions in two-three years.

Search terms: Solid state devices; Automatic control; Digital computers; Multiplexers; Engine tests; Electronic devices in vehicles

AVAILABILITY: SAE

HS-011 510 Fld. 5/4

CONSIDERATIONS IN DESIGNING AN AUTOMOTIVE BUMPER SYSTEM IN TODAY'S ENVIRONMENT

by John A. Alfes; Robert W. Mathews; F. F. Timpner

General Motors Corp.

1971 59p
Report no. GM-Eng-Pub-4631

Includes *Vehicle Impact Analysis,* by F. F. Timpner as Appendix B. Presented at Society of Automotive Engineers mid-year meeting, 7 June 1971.

Designing for improved bumper performance requires analysis of three principal factors: (1) bumper location for contact with other bumpers; (2) clearance of the bumper from the nearest vulnerable body surface; and (3) management of the impact energy. To develop the optimum bumper system, accident statistics, collision tests, repair costs, promised insurance premium reductions, and projected costs of the various levels of protection should be considered.

Search terms: Bumper design; Bumper height; Energy absorbing bumpers; Impact forces; Repair costs; Clearance; Vehicle design; Impact tests

HS-011 511 Fld. 5/4

DESCRIPTION OF A UNIVERSAL PULLING MACHINE

by Ulrich W. Seiffert

Volkswagenwerk A.G. (West Germany)

1972 7p 2refs
Report no. SAE-720223

Presented at Automotive Engineering Congress, Detroit, 10-14 Jan 1972.

A pulling machine with nine separate pulling cylinders, which are operated hydraulically from a central unit, is described. Each cylinder can be operated singly or in parallel with another. The operation of the cylinders is controlled by an electronic unit that compares the voltage signals representing the required and the actual values. The regulating characteristics are travel or position control, speed control, and force control. The principle of the test machine and objectives during different tests for checking the strength of seat belts, seat belt anchorage points, door and roof rigidity, and simulation of a frontal crash with quasi-static deformation of the vehicle front-end are described.

Search terms: Test equipment; Pulling; Seat belt assembly anchorages; Seat belt tests; Impact tests; Hydraulic equipment; Body tests

HS-011 512 Fld. 5/4

SIMULATION OF ROLLOVER WITH A DYNAMIC ROOF CRUSH TEST

by U. W. Seiffert

Volkswagenwerk A.G. (West Germany)

1972 8p 5refs
Report no. SAE-720226

Presented at Automotive Engineering Congress, Detroit, 10-14 Jan 1972.

Tests to simulate rollovers are currently very often criticized because of the nonreproducibility of the tests and their results. A test procedure is used by Volkswagen in which a flat impact plate equal to the empty weight of the vehicle is dropped from a defined height onto the roof of the vehicle. The vehicle can be mounted on a bed at various angles relative to the impact plate. The results with this simple test method provide a comparative scale for roof rigidity rather than an absolute comparison with dynamic vehicle rollover roof rigidity. The problem of definition and evaluation of survival space is described. Based on the definitions that exist today, it is impossible to define a fixed survival space for assessing the behavior of vehicle roofs during rollover simulation tests.

Search terms: Crush tests; Rollover tests; Roofs; Accident simulation; Volkswagens; Impact tests; Deformation; Drop tests

AVAILABILITY: SAE

HS-011 513 Fld. 5/4

GASKETS FOR SEALING '70s ENGINES

by S. M. Lillis

Published in *Automotive Industries* v145 n12 p57-61 (15 Dec 1971)

A summary of gasket materials such as cellulose, asbestos, synthetic rubber, and metals is presented. Applications for gasoline, diesel, and rotary engines are described.

Search terms: Gaskets; Diesel engines; Internal combustion engines; Rotary engines; Asbestos; Cork; Cellulose; Metals; Synthetic rubber

HS-011 514 Fld. 5/4

INVESTIGATION OF VEHICLE SIDE IMPACT STIFFNESS—COMPARISON OF STATIC AND DYNAMIC TESTS

by Hartmut Rau

Technische Univ., Berlin (West Germany)

1972 25p 4refs
Report no. SAE-720224

Presented at Automotive Engineering Congress, Detroit, 10-14 Jan 1972.

This investigation contributes guidelines for a final test procedure with two advantages: to be, on the one hand, simply practicable and reproducible and, on the other hand, to provide results corresponding as closely as possible to real accidents. The investigation emphasized testing of side parts significant to the objectives of the test: door only, door and sill, or door, sill and roof. New cars as well as heavily rusted vehicles were used for the test.

Search terms: Side impact tests; Static tests; Dynamic tests; Vehicle age; Roofs; Deformation analysis; Force; Door systems; Door system failures; Displacement; Energy absorption

AVAILABILITY: SAE

HS-011 515 Fld. 5/4

A PROCEDURE FOR DESIGNING AGAINST FATIGUE FAILURE OF NOTCHED PARTS

by L. E. Tucker

Deere and Co.

1972 22p 34refs
Contract N00156-70-C-1256
Report no. SAE-720265

Presented at Automotive Engineering Congress, Detroit, 10-14 Jan 1972. This investigation was conducted at the Univ. of Illinois.

The procedure is based on measuring nominal loads or strains and estimating notch root stresses and strains using Neuber's rule. Other inputs to the procedure are axial smooth specimen cyclic stress-strain response, fatigue properties, and fatigue notch factor. Miner's cumulative damage rule is applied to the local stress-strain history and fatigue life predicted. Examples are given where life predictions are compared to laboratory test results.

Search terms: Fatigue life; Fatigue (materials); Stress measurement; Strain (mechanics); Notch sensitivity; Cyclic pressures; Beam tests; Loading (mechanical); Strain gauges; Steels; Frame tests; Stress (mechanics); Hysteresis

AVAILABILITY: SAE

HS-011 516 Fld. 5/4

ENGINE PROPULSION MATCHING FOR HIGH-SPEED CRAFT

by Richard Hecker

Naval Ship Res. and Devel. Center

1972 12p 16refs
Report no. SAE-720279

Presented at Automotive Engineering Congress, Detroit, 10-14 Jan 1972.

An investigation was made to determine the performance of supercavitating versus conventional propeller in relation to hydrofoil craft. Powering requirements are given for a typical hydrofoil craft, and a preliminary choice of propeller diameter and pitch ratio has been made. It is shown that the supercavitating propeller fulfills the requirements of high-speed craft at speeds exceeding 100 knots, whereas at speeds greater than 60 knots the conventional propeller fails. This paper also shows that supercavitating sections have good drag-to-lift ratios when the propeller is driven at high rotative speeds. Mention is made of the successful application of lightweight gas turbines to marine use.

Search terms: Hydrofoils; Gas turbine engines; Marine engines; High speed; Engine operating conditions; Engine speeds; Engine performance; Mathematical models; Cavitation; Drag; Lift; Propellers

AVAILABILITY: SAE

HS-011 517 Fld. 5/4

ELASTOMER PROMISES ELECTRICAL BREAKTHROUGH

by Joseph M. Callahan

Published in *Automotive Industries* v145 n12 p45-9, 71 (15 Dec 1971)

Pressex may have the potential of eliminating failures of the 500 to 1,000 electrical connections in an automobile. The material practically eliminates the chance for misalignment, conserves electrical power, and has the potential of acting as a circuit breaker.

Search terms: Elastomers; Electric systems; Wiring; Electric cables; Pressex

HS-011 518 Fld. 5/4

APPLICATIONS OF RESIDUAL STRESS MEASUREMENTS

by R. W. Buennekе

Caterpillar Tractor Co.

1972 6p 9refs
Report no. SAE-720243

Presented at Automotive Engineering Congress, Detroit, 10-14 Jan 1972.

Two applications of x-ray residual stress measurements in steel are reported. One shows how residual stresses have a direct bearing on fatigue strength caused by varying material and heat treatment. The other application shows how x-ray diffraction measurements can help determine the cause of grinder cracking in carburized and hardened steel parts. Grinder cracking occurs by overheating the surface which produces tensile residual stresses that exceed the fracture strength of the steel. Also, there appears to be a relationship between retained austenite content and the grinder cracking phenomenon.

Search terms: Residual stress measurement; Steels; Fatigue tests; Fatigue life; Heat treatment; Grinding; Cracking; Tensile strength; Fracture mechanics; Austenite; Gears; Xray diffraction; Xray analysis

AVAILABILITY: SAE

HS-011 519 Fld. 5/4; 4/5

COMPUTER ASSISTED VALVE TRAIN DESIGN AND DEVELOPMENT, PART 2

by R. C. Dennis

Ford Motor Co.

1972 8p
Report no. SAE-720213

Presented at Automotive Engineering Congress, Detroit, 10-14 Jan 1972.

Computer programming in list processing and parametric representation of geometric curves and surfaces must be developed for efficient computer usage in engine design. List processing techniques are required for an operational procedure for data base maintenance. Parametric geometry must be incorporated so that engine assembly and detail drawings can be stored in the computer memory. The data base can then serve all activities related to the valve train.

Search terms: Valves; Curved surfaces; Computerized design; Engine design; Data acquisition; Geometry

AVAILABILITY: SAE

HS-011 520 Fld. 5/4; 4/7

DATA RETRIEVAL BY ACCIDENT RECONSTRUCTION FOR SAFER VEHICLE DESIGN

by R. I. Emori; J. D. Baird

California Univ.; University of Southern California

1972 8p 11refs
Report no. SAE-720284

Presented at Automotive Engineering Congress, Detroit, 10-14 Jan 1972.

The effectiveness of safety design must be justified in terms of real automobile accidents with human occupants. Full-scale collision experiments are performed with dummies and mathematical models. The results from the substitutes to the reality are then extrapolated. Full-scale collision experiments with human occupants could be performed by reconstructing real automobile accidents accurately. To retrieve the most needed date for further improvements in safety design and to translate actual accidents as controlled experiments, an engineered method was developed to reconstruct accidents. The method was applied to an actual accident, indicating that the methodology is sound and accurate.

Search terms: Mathematical models; Accident reconstruction; Crash phase; Fatality rates; Rear end collisions; Accidents by vehicle size; Impact tests; Deceleration caused injuries; Acceleration injuries; Deformation analysis; Collision models; Postcrash phase; Injury causes; Safety design; Vehicle trajectories; Information retrieval

AVAILABILITY: SAE

HS-011 521 Fld. 5/4; 5/14

DETROIT'S SEARCH FOR THE SAFE AUTOMOBILE

by Frank Beaumier

Published in *Motor Service* p28-31 (Dec 1971)

New developments in the experimental safety vehicle (ESV) are described. Specifications are given for General Motors' and Ford's ESVs. General Motors is creating a completely new running car while Ford is adding minor changes to a standard Galaxie model. Similar safety items appear in the two

Vs: air bags; adjustable foot controls d fixed seats; and energy absorbing mes and bumpers. Both cars are over weight requirement. Some other tures of the General Motors car are: dding to protect occupants in 30 mph shes; fixed side glass to reduce the ance of ejection in rollover; and a uble brake circuit. Ford's ESV has a odified frame designed to absorb 65% the energy of a 50 mph barrier crash d a front end to absorb 35% of the sh energy. Ford is reportedly develop- cushion-type seat belts as a possible ernative to air bags.

Search terms: Experimental automobiles; Air bag restraint systems; Safety cars; General Motors Corp.; Ford Motor Co.; Occupant protection; Crashworthiness; Vehicle characteristics; Energy absorption

6 Fuel Systems

S-011 522 Fld. 5/6

METABLE FOR LEAD

M. H. Hyman

ublished in *Environment* v13 n5 p14-23 un 1971)

refs

l lead could be removed from gasoline 1973 at a trivial cost to the consumer. Speedier removal would be more pensive. Lower octane requirements r new cars are helping, and the present rge price increases for nonleaded gas nnot be accounted for by the cost of moval.

Search terms: Lead free gasoline; Octane ratings; Exhaust emission control; Hydrocarbons; Low lead gasoline; Leaded gasoline; Fuel costs; Octane requirements

S-011 523 Fld. 5/6

XHAUST HYDROCARBON MISSIONS FROM GASOLINE ENGINES—SURFACE PHENOMENA

by W. W. Haskell; C. E. Legate

Shell Oil Co.

1972 14p 17refs
Report no. SAE-720255

Presented at Automotive Engineering Congress, Detroit, 10-14 Jan 1972.

Information obtained via a single-cylinder Cooperative Fuel Research engine supports the following hypotheses: there exists a critical piston top land-to-bore clearance above which hydrocarbon (HC) emissions decrease sharply; the presence of an oxidatively active catalytic surface in the combustion chamber increases HC emissions; using a clean engine operating on a fuel containing 5% lubricating oil, HC emissions increase within minutes to a level comparable to that obtained with equilibrium deposits; the first parcel of gas to leave the exhaust valve contains an order of magnitude lower concentration of HCs than does the total mixed exhaust; and a cylinder bore tapered outward towards the top eliminates oil-droplet formation in a motored engine. To predict exhaust HC emissions from the top land volume, an equation is derived which accounts for the effects of piston and bore expansion, blowby, and cylinder-pressure ratio.

Search terms: Hydrocarbons; Single cylinder engines; Lubricant additives; Cylinder pressure; Pistons; Exhaust emissions; Blowby; Engine operating conditions; Catalysis; Combustion chamber deposits; Equations; Fuel composition

AVAILABILITY: SAE

HS-011 524 Fld. 5/6

HYDROCARBON COMPOSITION OF THE ATMOSPHERE OF THE LOS ANGELES BASIN—1967

by Aubrey P. Altshuller; William A. Lonneman; Frank D. Sutterfield; Stanley L. Kopczynski

Published in *Environmental Science and Technology* v5 n10 p1009-16 (Oct 1971)

Data from 100 samples which were collected at two different sites (downtown Los Angeles and Azusa) revealed the presence of both aliphatic and aromatic hydrocarbons. Although a large number of hydrocarbons are present in polluted atmospheres, most of these substances contribute little to the total hydrocarbon concentration. But n-butane, n-pentane, and isopentane contribute to ozone formation; ethylene, toluene, and m-xylene are potential eye irritants.

Search terms: Hydrocarbons; Air pollutants; Los Angeles; Aliphatic hydrocarbons; Aromatic hydrocarbons; Azusa; Time of day; Gas chromatography; Air pollution effects

HS-011 525 Fld. 5/5

ENGINE SPEED AND LOAD EFFECTS ON CHARGE DILUTION AND NITRIC OXIDE EMISSION

by William R. Aiman

General Motors Res. Labs.

1972 10p 17refs
Report no. SAE-720256

Presented at Automotive Engineering Congress, Detroit, 10-14 Jan 1972.

The effects of engine speed and load on nitric oxide emission were investigated with a single-cylinder engine operated at conditions representative of those found in the 7-mode, 7-cycle Federal Emissions Test Cycle. The fuel-air mixture was constant at 83% of stoichiometric and the spark settings were optimized. Nitric oxide emission increased as engine speed and load were increased. The effects were interdependent, in that the effect

5/6 Fuel Systems (Cont'd.)

HS-011 525 (Cont'd.)

of speed was greatest at low load and the effect of load was greatest at low speed. Both speed and load effects were larger when valve overlap was higher. Engine speed and load affected exhaust nitric oxide concentration primarily via influences on charge dilution. This finding explains the interdependency of the speed and load effects, and also why they depended on valve overlap.

Search terms: Nitric oxide; Engine speeds; Exhaust emission tests; Exhaust emissions measurement; Single cylinder engines; Mathematical analysis; Engine operating conditions; Air fuel ratio; Loading tests; Charge dilution; Valve timing

AVAILABILITY: SAE

HS-011 526 Fld. 5/6

A DIGITAL MEMORY FUEL CONTROLLER FOR GASOLINE ENGINES

by M. Williams

Lucas (Joseph) (Electrical) Ltd. (England)

1972 7p 5refs
Report no. SAE-720282

Presented at Automotive Engineering Congress, Detroit, 10-14 Jan 1972.

A digital memory fuel control unit has been developed for Otto cycle engines which enables low-pollution exhaust emissions to be achieved, coupled with good drivability and mechanical performance. The unit was tested on a Triumph 2.5 PI vehicle, and the practical results achieved fall just short of the requirements of the 1975 federal and California legislation. The electronic controller receives signals relating to the engine's instantaneous operating conditions and, by reference to its digital memory, computes the optimum fuel required. The capacity of the controller's memory is effectively increased by an interpolation technique. The controller operates as an on-line process control computer, of cigar box dimensions, which is able to exist in the arduous automotive environment.

Search terms: Gasoline consumption; Otto cycle engines; Air fuel ratio; Exhaust emission control; Exhaust emission standards; Electronic fuel injection; Digital computers; Engine operating conditions; Mathematical models; Engine speeds

AVAILABILITY: SAE

HS-011 527 Fld. 5/6

DESIGN REFINEMENT OF INDUCTION AND EXHAUST SYSTEMS USING STEADY-STATE FLOW BENCH TECHNIQUES

by G. F. Leydorf, Jr.; R. G. Minty; M. Fingeroot

American Motors Corp.

1972 24p 8refs
Report no. SAE-720214

Presented at Automotive Engineering Congress, Detroit, 10-14 Jan 1972.

Application of steady-state flow-bench techniques to engine intake- and exhaust-system components usually produces significant gains in flow capability. Instrumentation, equipment, and procedures are described and empirical design guidelines are presented. Case studies are used to illustrate the process of design refinement; variety of flow-bench programs on induction- and exhaust-system components is described; methods of attack are illustrated.

Search terms: Exhaust manifolds; Intake manifolds; Air flow rates; Steady state; Exhaust systems; Intake systems; Exhaust ports; Exhaust valves; Engine performance; Computerized test methods; Computer programs

AVAILABILITY: SAE

HS-011 528 Fld. 5/6

THE EFFECT OF FUEL HYDROCARBON COMPOSITION ON EXHAUST HYDROCARBON AND OXYGENATE EMISSIONS

by Eric E. Wigg; Raymond J. Campion; William Lewis Petersen

Esso Res. and Engineering Co.

1972 14p 21refs
Report no. SAE-720251

Presented at Automotive Engineering Congress, Detroit, 10-14 Jan 72.

Fuel-exhaust compositional relationships are derived for exhaust hydrocarbons and aldehydes using data obtained with 18 full-boiling-range gasolines used as fuel in a late-model vehicle. The data indicate that aromatic hydrocarbon and aromatic aldehyde emissions are linearly related to fuel aromatic content while exhaust olefin and aliphatic aldehyde emissions show an inverse relationship. Regression analysis of the aromatic hydrocarbon and aldehyde data expressed as a function of fuel aromaticity gives fuel aromatic coefficients of 0.49 and 0.41 for the hydrocarbon and aldehyde expressions, respectively. Exhaust photochemical reactivity calculations, using a composite reactivity scale, predict that fuel aromatic content has little influence on exhaust reactivity. A comparison of data obtained using the 1968, 1972, and 1975 Federal test procedures shows the existence of only minor differences in exhaust composition. However, elimination of the cold start from the 1972 test procedure did have a significant effect on the results.

Search terms: Exhaust emission tests; Lead free gasoline; Fuel composition; Hydrocarbons; Olefins; Aromatic compounds; Aldehydes; Photochemical reactions; Exhaust composition; Regression analysis; Aliphatic aldehydes; Oxidation; Engine operating conditions; Mathematical models; Hotstarts; Coldstarts

AVAILABILITY: SAE

HS-011 529 Fld. 5/6

CONTROL OF EXHAUST POLLUTION THROUGH A MIXTURE-OPTIMIZER

by Paul H. Schweitzer

Optimizer Control Corp.

1972 19p 39refs
Report no. SAE-720254

Presented at Automotive Engineering Congress, Detroit, 10-14 Jan 1972.

A proposed set of modifications, which, in combination with a mixture-Optimizer, enables a spark-ignition engine to accept air-fuel mixtures as lean as 22 - 23.5:1 without impairment of driveability, will permit the simultaneous reduction of all pollutant exhaust emissions, unburned hydrocarbons, carbon monoxide, and nitrogen oxides, to a very low level. Under such circumstances, the true best economy mixture largely coincides with the mixture ratio that minimizes the exhaust emissions. The mixture-Optimizer is a feedback type of electronic control device which automatically selects for a carburetor or fuel injection system the air-fuel ratio that yields the minimum fuel consumption for any given power output. By seeking these mixture ratios, it tends to reduce all pollutant exhaust emissions that are under legal control. The mechanism of the mixture-Optimizer is described and results of simulated tests are presented.

Search terms: Exhaust emission control devices; Air fuel ratio; Nitrogen oxides; Carbon monoxide; Electronic fuel injection; Lean fuel mixtures; Fuel economy; Mathematical models; Spark ignition engines; Driveability; Engine modification; Engine operating conditions; Fuel mixtures; Unburned hydrocarbons; Fuel consumption; Spark timing

AVAILABILITY: SAE

HS-011 530 Fld. 5/6

THE EFFECT OF SOME GASOLINE COMPOSITIONAL FACTORS ON ATMOSPHERIC VISIBILITY AND SOILING

by John M. Pierrard; Richard A. Crane

Du Pont de Nemours (E. I.) and Co.

1972 29p 18refs
Report no. SAE-720253

Presented at Automotive Engineering Congress, Detroit, 10-14 Jan 1972.

Laboratory tests showed that light scattering and soiling were increased by increasing the aromatic content, removing lead antiknocks, or increasing the combined amounts of sulfur and phosphorus in gasoline. Light scattering and soiling appeared to correlate more closely with the volume, rather than the mass, of air-suspendable particulate matter. Field tests were carried out in an unused, 6,200-foot long, Pennsylvania Turnpike tunnel using two matched four-car fleets. The air in the tunnel sampled during the tests with cars using unleaded gasolines soiled filters 57% more than the air sampled during tests with cars using leaded gasolines. The particulate matter from the unleaded fleet caused nearly twice as much decrease in light transmission as did that from the leaded fleet.

Search terms: Vehicle mileage; Gasoline; Lead free gasoline; Fuel composition; Air pollution effect on visibility; Particulate air pollutants; Exhaust emissions; Light scattering; Aromatic compounds; Air pollution in tunnels; Exhaust emissions measurement; Sight distances; Sulfur; Pennsylvania; Statistical analysis; Exhaust emission tests; Hydrocarbons; Field tests; Laboratory tests; Reduced visibility; Light transmission; Phosphorus

AVAILABILITY: SAE

5/9 Inspection

HS-011 531 Fld. 5/9; 5/11

INSPECTION PLUS MAINTENANCE AND REPAIR EQUALS SAFETY

by Larry Johnson

Published in *Motor Service* p32-3, 50 (Dec 1971)

A procedure is suggested for an in-shop safety inspection covering lights, visibility, horn, tires and wheels, steering and suspension, wheel alignment, brakes, engine and drive line, speedometer, exhaust system, seats and seat belts, locks and latches, body, fenders, and bumpers. Guidelines are given for inspecting and estimating a wrecked car depending on where the impact occurred: above front bumper, at or below it, angle impact at front, impact at rear or on side.

Search terms: Inspection procedures; Inspection effectiveness; Vehicle inspection; Body inspection; Damage estimation; Damage patterns; Damage severity

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HS-011 532 Fld. 5/9; 5/20

DANGER POINTS IN YOUR RIG

by V. L. Oertle

Published in *Wheels Afield* v6 n4 p62-4 (Apr 1972)

A checklist of inspection procedures for camping vehicles is presented covering running gear, tires, steering components, brakes, trailer brakes, parking brake, towing hardware, propane system, electrical system, and campground safety.

Search terms: Campers (truck mounted); Inspection procedures

5/11 Maintenance and Repairs

HS-011 533 Fld. 5/11

AN INVITATION TO DEATH

by Bob Crane

Published in *California Highway Patrolman* v35 n10 p5, 22-3, 26-7 (Dec 1971)

Almost every car on the road today has some safety related defect that can cause an accident. A survey conducted by a national traffic safety organization revealed that one of the major reasons people knowingly drive unsafe cars is financial in nature. However, the average motorist will pay less if he repairs his car before he has an accident, even if the repair job is a major one.

Search terms: Defect correction; Automobile repair; Automobile maintenance; Automobile defects; Automobile repair costs; Negligence; Risk taking; Accident causes; Failure caused accidents; Preventive maintenance

HS-011 534 Fld. 5/11; 5/9

DIAGNOSTIC EQUIPMENT FOR ARMY VEHICLES

by D. S. Sarna; F. Pradko; D. F. Ancona

Army Tank-Automotive Command

1972 12p
Report no. SAE-720236

Presented at Automotive Engineering Congress, Detroit, 10-14 Jan 1972.

Three generations of equipment are discussed. The first is a family of computer-controlled automatic test equipment for diagnosis of a complete vehicle; in the second, a transducer kit will be permanently installed on the vehicles with provision for connection to the computer; the third generation will be an on-board go/no-go system to indicate the condition of major components (no external test equipment needed).

Search terms: Diagnostic centers; Automated inspection equipment; Military vehicles; Vehicle maintenance; Computerized test methods; Vehicle inspection; Transducers; Electronic monitoring systems; Test equipment; Engine tests

AVAILABILITY: SAE

5/14 Occupant Protection

HS-011 535 Fld. 5/14

SEATBELT STUDY, 1970, "BUCKLE UP"

Washington State Patrol

1971 8p

Statistics for 1970 show that in investigated traffic accidents, out of 129,395 vehicle occupants whose use of seatbelts was known, 98,968 or 76.5% failed to buckle up. Still worse, 93.1% of those killed in motor vehicles and 89.6% of those receiving disabling injuries were not wearing seatbelts at the time of their accidents. Finally, 29.1% of all vehicle occupants were riding in vehicles in which seat belts had not been installed. Persons wearing seat belts represented 23.5% of total vehicle occupants but only 6.9% of those killed and 10.4% of those disabled. Statistics are given on seat belt usage by age group and sex.

Search terms: Seat belt statistics; Seat belt usage; Seat belt usage by seat occupation; Washington; Injury severity; Injury rates; Fatality rates; Age factor in accidents; Sex factor in accidents; Injury prevention

HS-011 536 Fld. 5/14

ALL YOU NEED TO KNOW ABOUT. . .THE FEDERAL MOTOR VEHICLE SAFETY STANDARDS

by Don Fox

Published in *Popular Imported Cars* v7 n2 p10-3, 59, 65-6 (Mar 1972)

The background on the Federal Motor Vehicle Safety Standards is given. Standard SS208 requires passive restraint systems or a lap and shoulder belt system capable of protecting occupants in a 30 mph frontal crash. Air bags and various other restraint systems being developed to meet this standard are discussed.

Search terms: Air bag restraint systems; Seat belts; Shoulder harnesses; Occupant protection; Vehicle safety standards; Passive restraint systems; Restraint system design

HS-011 537 Fld. 5/14; 1/5; 1/2

EFFECTIVENESS OF LAP SEAT BELTS AND THE ENERGY ABSORBING STEERING SYSTEM IN THE REDUCTION OF INJURIES

by D. N. Levine; B. J. Campbell

North Carolina Univ. Hwy. Safety Res. Center

1971 50p 4refs

Data were extracted from a pool of accident reports from vehicles involved in crashes in North Carolina in 1966 and 1968. Significant reductions associated with the energy absorbing steering system were recorded for medium speed frontal impact and car-ran-off-road accidents. The magnitude of the reduction was about 30%. For the seat belt, reductions were observed in these situations as well as many others. The largest reductions were for high speed accidents, and the overall reduction is estimated at 43%. In contrast to previous studies, seat belts provided significant benefit in front impact situations.

Search terms: Seat belt effectiveness; Energy absorbing steering columns; Seat belt usage; Front end collisions; Ran off road accidents; Probability theory; North Carolina; Injury severity; Injury prevention; Statistical analysis; High speed; Speed patterns

5/15 Propulsion Systems

HS-011 538 Fld. 5/15

THE BLACK BOX

by T. Aaronson

Published in *Environment* v13 n10 p10-8 (Dec 1971)

29refs

The fuel cell, which can run on natural gas, could provide each home or office building with its own electric power supply, producing fresh water in the process. Other versions might power automobiles and industrial plants. The fuel cell would be essentially pollution-free.

Search terms; Fuel cells; Electric power generation; Hydrocarbon fuel cells; Ammonia air fuel cells; Hydrazine air fuel cells; Power costs; Natural gas

HS-011 539 Fld. 5/15; 5/2

CHARACTERISTICS OF URBAN BUS DRIVING CYCLES

by R. A. Renner; D. Lawhorn

International Res. and Technology Corp.; Instrumentation Associates

1972 7p 7refs
Report no. SAE-720239

Presented at Automotive Engineering Congress, Detroit, 10-14 Jan 1972.

In preparation for the California Steam Bus Project, diesel-powered city buses were road-tested over two contrasting routes (driving cycles). Special instrumentation was used to continuously monitor distance, speed, acceleration, road gradient, and engine rpm. From these data, profiles of power requirements were derived, together with cumulative values of propulsive and braking energy. The driving cycles were characterized by statistical distribution functions of key variables.

Search terms: Steam buses; Road tests; California; Statistical analysis; Instrumented vehicles; Parameters; Road grades; Fuel consumption; Engine speeds; Power output; Electronic monitoring systems; Acceleration; Bus tests; Diesel engines

AVAILABILITY: SAE

5/17 Safety Defect Control

HS-011 540 Fld. 5/17

DETROIT'S MOTOR MOUNT DILEMMA: THE TRAGIC FLAW

by C. Packard

Published in *Motor Trend* v24 n3 p84-6, 88, 110 (Mar 1972)

On December 4, 1971, General Motors Corp. announced its Chevrolet Division would notify owners of approximately 6,682,000 1965 through 1969 Chevrolets and arrange for the installation (at the company's expense) of restraints to limit the lifting of the engine should an engine mount break. The story of the largest recall in the history of the automobile industry is presented.

Search terms: Engine mounts; Chevrolets; Automobile recall campaigns; Defect correction; Automobile defects; Engine mount failures

5/18 Steering Control System

HS-011 541 Fld. 5/18

FLEXIBLE SHAFTS FOR STEERING

by John Dewees

Published in *Automotive Industries* v145 n12 p64-6 (15 Dec 1971)

Reasons for using flexible shaft cores are safety, bending to fit into the gear box, absorption of road vibration, and low cost. Requirements for use as a steering column link include breaking torque, deflection or backlash in the core, torque-to-rotate, torsional hysteresis, helixing, and side load.

Search terms: Energy absorbing steering columns; Torque; Shaft materials; Shafts; Flexible steering columns

HS-011 542 Fld. 5/18; 2/4; 4/5

ANALYSIS OF THE EFFECTS OF HIGHWAY AND ROADSIDE GEOMETRICS ON MOTOR VEHICLE BEHAVIOR

by Raymond R. McHenry; Norman J. DeLeys; John P. Eicher

Cornell Aeronautical Lab., Inc.; Federal Hwy. Administration

1971 25p 10refs
Contract CPR-11-3988

Prepared for presentation at 57th annual meeting, American Association of State Highway Officials, Miami Beach, 6-10 Dec 1971.

A digital computer program is described which predicts the detailed dynamic responses of a motor vehicle, with adjustable dimensions and properties, as it traverses selected combinations of highway and roadside geometric design features and/or contacts some types of fixed obstacles. A computer-graphics display has been developed which produces detailed perspective drawings of the vehicle and terrain as seen from selected viewing positions and at selected intervals of time during a simulated maneuver. Sample comparisons are presented of analytically predicted vehicle responses and full-scale test results in the formats of both time-history plots and computer-graphics displays. Impact

5/18 Steering Control System (Cont'd.)

HS-011 542 (Cont'd.)

tests with bridge railings and loss of control when traversing railroad grade crossings are discussed.

Search terms: Computer programs; Computerized simulation; Highway design; Vehicle dyanmics; Topographical factors; Skidding; Bridge parapets; Fixed objects; Impact tests; Road shoulders; Loss of control; Computerized design; Vehicle road interface; Mathematical models; Time factors; Vehicle stability; Ramps; Railroad grade crossings

5/20 Trucks and Trailers

HS-011 543 Fld. 5/20

EQUALIZING HITCHES

by K. Fermoyle; S. Murray

Published in *Wheels Afield* v6 n4 p67-70 (Apr 1972)

The theory, installation, and maintenance of equilizing hitches for travel trailers are discussed.

Search terms: Travel trailers; Equilizer hitches; Towing

HS-011 544 Fld. 5/20

INTERIOR CAB DESIGN OF THE IH TRANSTAR

by R. E. McAfee

International Harvester Co.

1972 8p
Report no. SAE-720262

Presented at Automotive Engineering Congress, Detroit, 10-14 Jan 1972.

International Harvester's approach to total driver environment is outlined. This includes physical room, control placement, visibility, interior noise level, occupant protection, and temperature control. All of these factors have an effect on a driver's temperament and fatigue level. Reduction of adverse effects contribute to a driver's alertness.

Search terms: Interior design; Human factors engineering; Field of view; Noise control; Occupant protection; Interior climate control systems; Truck cab interiors

AVAILABILITY: SAE

HS-011 545 Fld. 5/20; 2/7

SNOWMOBILE NOISE: ITS SOURCES, HAZARDS AND CONTROL

National Res. Council of Canada

1970 38p 9refs
Report no. APS-477; NRC-11272

Detailed data are presented on snowmobile noise sources (exhaust, engine compartment, carburetor air intake), effects of different types of mufflers and other modifications on noise reduction, and measurements of noise levels of one-cylinder and two-cylinder engines. It is recommended that manufacturers provide quieter snowmobiles; that legislation be adopted to limit the noise from snowmobiles to 85 dBA measured at a distance of 15 feet; and that drivers and passengers of existing snowmobiles wear effective acoustical ear plugs or covers.

Search terms: Snowmobiles; Vehicle noise; Acoustic measurement; Sound intensity; Noise tolerances; Mufflers; Engine noise; Noise control; Exhaust noise; Deafness

5/22 Wheel Systems

HS-011 546 Fld. 5/22; 2/4

THE EFFECTS OF STUDDED TIRES. RESEARCH SUMMARY REPORT. PREPARED FOR THE LEGISLATURE OF MINNESOTA

Minnesota Dept. of Highways

1971 53p 17refs

Studded tires have damaged highway pavements by abrading surfaces and producing troughs in the wheel tracks of the traffic lanes. The degree of wear is proportional to traffic volume so that the greatest wear is observed on high-speed, high-volume roadways. Sand and salt increase the wear of pavements subjected to studded-tire traffic, but have virtually no adverse effect on pavements carrying unstudded-tire traffic. It is possible to formulate more wear-resistant pavement compositions, both concrete and bituminous, but the wear reduction achieved with specially-selected materials is counterbalanced by a corresponding increase in cost. If studded tires were discontinued, there would be little appreciable change in traffic safety in Minnesota. Accident studies indicate insufficient benefit from studded tires to justify their use on safety grounds.

Search terms: Studded tires; Icy road conditions; Tire studs; Pavement damage; Salts effects; Winter driving; Bituminous concrete pavements; Pavement wear; Road condition caused accidents; Accident rates; Skidding accidents; Winter accidents; Pavement tests; Concrete pavements; Accident studies; Minnesota; Stopping distance; Road materials; Laboratory tests; Wear tests; Pavement skidding characteristics

HS-011 547 Fld. 5/22; 4/1

THE GREAT STUDDED TIRE CONTROVERSY

by R. B. Overend

Published in *Traffic Safety* v71 n12 p8-10, 35-9 (Dec 1971)

Performance of studded tires, snow tires, and highway tires on test ice and on actual road surfaces is described. Test ice results show improved performance of studs, while actual road tests, in some cases, showed an increase in stopping distances. Legislation banning studded tires is based on the damage to road surfaces outweighing the reputed safety benefits.

Search terms: Studded tires; Road conditions; Tire chain traction; Stopping distance; Snow tires; Pavement damage; Tire traction; Studded tire bans

5/23 Windshield-Related Systems

HS-011 548 Fld. 5/23

RAIN, RAIN GO AWAY. THE DEVELOPMENT OF WINDSCREEN WIPERS

by J. McLellan

Published in *Rubber Developments* v24 n4 p110-16 (1971)

The development of windshield wipers in Europe and the U. S. from 1917 to the present is described.

Search terms: Windshield wiper design; Windshield wiper blades

executive summary

SYNOPSIS OF A RECENTLY RELEASED NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION RESEARCH REPOR

ANALYSIS OF DAISY TRACK HUMAN TOLERANCE TESTS.

FINAL REPORT

The purpose of the test program was to compare and evaluate lap belt versus lap belt plus air cushion restraints.

Contract No. FH-11-6962
Highway Safety Research Institute
The University of Michigan
Huron Parkway and Baxter Rd.
Ann Arbor, Michigan 48105

Award Amount: $784,914.00
Contractual Period:
June 8, 1968 through July 1, 1971
Report Date: February 1971

DOT/HS-800 498 Final Report

TEST APPROACH

Six male human volunteers were subjected to increasingly severe impacts in each of the two restraint configurations being compared until in the subject's (subjective tolerance) or the medical monitor's opinion the testing should be terminated. Testing with the other restraint was to be continued until a similar level was reached.

The volunteers were seated on the Daisy Decelerator impact sled using each of the restraint systems being tested (lap belt versus lap belt plus air cushion). The seat used on the sled during all of these tests was one designed for other ARL (Aeromedical Research Laboratory) human impact tests and contained instrumentation capable of measuring all forces transmitted to it by the subject during impact.

TEST RESULTS

According to the contractor the statistical analysis indicated that

- o The lap belt plus a rapidly inflating bag performed significantly better than the lap belt alone in the following ways:
    - Reduced head motion both linear and angular
    - Reduced linear head acceleration
    - Reduced shoulder motion
    - Reduced neck pain.
- o There were, however, no significant differences in
    - Angular acceleration of the head
    - Chest linear acceleration
    - Lap belt load
    - Pelvis pain
    - Foot pan load
    - Seat back rebound load.

It should be emphasized that the statistical indicators used here imply significance on a necessary basis only not on a "necessary and sufficient" basis. Thus if more tests of comparable types are performed it may well happen that some of the non-significantly different mean comparisons would move to the significant category but it would be highly improbable that significantly different mean comparisons would move into the non-significant category.

The Contract Technical Manager has certified that the contractor's work has been satisfactorily completed and that all contractual obligations have been met.

The opinions, findings, and conclusions expressed in this summary are those of the contractor and not necessarily those of the National Highway Traffic Safety Administration.

Availability: National Technical Information Service (NTIS), Springfield, Va. 22152. Order in paper copy (PC) or microfiche (MF), DOT/HS-800 498

executiv
summary

A SYNOPSIS OF A RECENTLY RELEASED NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION RESEARC

INJURY CRITERIA MODEL FOR RESTRAINT SYSTEM EFFECTIVENESS EVALUATION.

FINAL REPORT

The purpose of this study was to develop an injury criteria model, formulated in computer language, and t generate a restraint system effectiveness index for evaluating the degree to which the vehicle environmen could prevent serious occupant injuries. The objective was to combine elements of a numerical injury ratin scale with human tolerance data and thus to propose an injury criteria model which could be universall applied to problems in impact protection.

Contract No. FH-11-6962
Highway Safety Research Institute
The University of Michigan
Huron Parkway and Baxter Rd.
Ann Arbor, Michigan 48105

Award Amount: $784,914.0
Contractual Period
June 8, 1968 through July 1, 197

DOT/HS-800 499 Final Report

BACKGROUND

The need for criteria of this type is based on the fact that, if the degree of protection offered to a vehicle occupant by a restraint system or a vehicle interior (a function of the distribution and magnitude of the forces transmitted to the occupant) could be expressed in quantitative terms, then: (1) more meaningful comparisons could be made between various restraint configurations; and, (2) areas of needed biomechanical research and statistical accident investigations could be more readily identified on the basis of the sensitivity of the results when applying the injury or effectiveness criteria.

STUDY ACCOMPLISHMENTS

o Injury Criteria Model

An injury criteria model has been developed which has been programmed for use with th HSRI Two and Three-Dimensional Mathematical Crash Victim Simulators, and which also ca be applied to experimental data gathered fro impact sled or barrier crash tests. This model i based on an extensive review of the state-of-the-art of impact tolerance data.

The model consists of three parts:

- An injury rating based on available human tolerance data including type of injury, seriousness, and the magnitude of physical quantities such as force and acceleration which are related to injury production;
- A relative motion criterion based on the extent to which adjacent body segments can move with respect to one another.
- An index reflecting the probability of a single simulated crash event.

- Analytical Effectiveness Index

An analytical effectiveness model has been developed to rate the overall protective capacity of a restraint system. Use of this index involves application of the injury criteria model to various occupant sizes, impact velocities, impact directions, etc. Thus, the effectiveness index (M) of a particular restraint system is based on multiple applications of the injury criteria model. Applications of this index are made to general restraint system performance evaluation, to use in connection with estimating compliance to motor vehicle safety standards, to estimating of the protective payoff offered by the introduction of safety-related motor vehicle hardware as a function of the probability of usage of such hardware, and to updating of the injury criteria model.

The Contract Technical Manager has certified that the contractor's work has been satisfactorily completed and that all contractual obligations have been met.

The opinions, findings, and conclusions expressed in this summary are those of the contractor and not necessarily those of the National Highway Traffic Safety Administration.

Availability: National Technical Information Service (NTIS), Springfield, Va. 22152. Order in paper copy (PC) or microfiche (MF), DOT/HS-800 499.

executive summary

YNOPSIS OF A RECENTLY RELEASED NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION RESEARCH REPORT

EMERGENCY MEDICAL SERVICES FOR AN URBAN AREA

The purpose of the study was to demonstrate and evaluate existing and alternative methods, including new techniques, of providing emergency medical services in an urban area.

Contract No. FH-11-6901
The City of Detroit
Mayor's Committee for Community Renewal
1108 City-County Building
Detroit, Michigan 48226

Award Amount:
$360,222.00
Contractual Period:
June 24, 1968 through April 28, 1970
Report Date: July 1970

DOT/HS-800 417 Summary
DOT/HS-800 418 Report

Background

In 1968, the State of Michigan adapted new ambulance operations standards. Concurrently the City of Detroit and the University of Michigan's Highway Safety Research Institute proposed that a demonstration study be initiated to study alternative methods of public-supported ambulance use in medical emergencies on the basis of timeliness, quality, and cost. Methods were sought that would improve emergency medical assistance.

Existing public and private (contracted) ground and air ambulance services were evaluated as to time elapsed between the call for help and the victim's delivery to a hospital, and the treatment available from ambulance crews. There also was analysis of communications, including the performance of two citizen-band radio reporting groups, with the object of improving the speed of accident detection and notification. The experience gained is being shared nationally.

FINDINGS, CONCLUSIONS, AND RECOMMENDATIONS

As a result of the study the contractor presented the following:

Findings:

- As few as 17 percent of the emergency responses made by public ambulances were for true medical emergencies, using a definition established by the study team.
- For the ground ambulance systems studied, the mean time from dispatch of the ambulance to arrival at the scene was less than five minutes—and 90 percent were accomplished within eight minutes.
- For the various ground ambulance systems studied the time from dispatch to hospital arrival for police, commercial and fire systems

averaged 17.5, 14.3 and 13.1 minutes respectively.

- The study of the effects of mobile radios on notification times were inconclusive. Simulation analysis suggests that one-fifth of all vehicles would need to be radio equipped in order to reduce the mean notification time by one minute.

- Ambulance personnel who were responsible for only emergency medical care at the scene (fire and commercial systems) provided appropriate treatment more frequently than the police.

- Although the frequency with which the police provided appropriate treatment was unchanged by additional training, it is suspected that this was due to the number of additional functions they are required to perform at the scene.

- The distribution of ambulances within a service area can affect response times. However, there is little difference in the times achieved by a uniform distribution policy versus one which places the ambulances in high demand areas.

- A helicopter ambulance can effectively execute some medical evacuations in an urban area. The opportunities for landing were greatest on freeways and major thoroughfares and decreased sharply in residential areas.

The greater speed of the helicoper was offset by the shorter distances traveled by the ground ambulances, both to the scene and to the hospital.

Conclusions:

- Because emergency responses in an urban area are relatively fast, it would be difficult to further reduce response times significantly. Further, the small differences in response times had no medical significance that could be demonstrated.

- The data suggest that, given comparable training and equipment, the quality of treatment can be duplicated by dual function personnel provided that their activities at the scene are limited to emergency medical care. Policemen were not as effective as the firemen and commercial ambulance personnel because they had to perform other duties in addition to those of emergency medical care at the scene.

  There was no significant improvement in the condition of the victim or in service time by using a municipal helicopter ambulance. The increased cost of an exclusive helicopter service was not justified.

Recommendations:

The major recommendation of the contractor resulting from this study of direct concern to the City of Detroit was that immediate action should be taken to transfer the entire public emergency ambulance service to the Detroit Fire Department. This would establish an organizational alignment within which the standards of the Michigan Ambulance Act, the Project findings and other future improvements in emergency medical service could be readily implemented. Detailed operational recommendations specifically directed to Detroit are included in the report.

The Contract Technical Manager has certified that the contractor's work has been satisfactorily completed and that all contractual obligations have been met.

The opinions, findings, and conclusions expressed in this summary are those of the contractor and not necessarily those of the National Highway Traffic Safety Administration.

Availability: National Technical Information Service (NTIS), Springfield, Va. 22152. Order in paper copy (PC) or microfiche (MF), DOT/HS-800-417 for the Summary volume and DOT/HS-418 for the complete report volume.

executive summary

A SYNOPSIS OF A RECENTLY RELEASED NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION RESEARCH RE

HSRI TWO-DIMENSIONAL CRASH VICTIM SIMULATOR: ANALYSIS, VERIFICATION, AND USERS' MANUAL. FINAL REPORT

The purpose of this study was to develop a two dimensional crash victim simulator which could be used as a tool to study advanced concepts and designs of seat restraint systems from the viewpoint of occupant protection.

Contract No: FH-11-6962
Highway Safety Research Institute
The University of Michigan
Huron Parkway and Baxter Road
Ann Arbor, Michigan 48105

Award Amount:
$784,914.00
Contractual Period:
June 28, 1968 through July 1, 1971
Report Date: December 1970

DOT/HS-800 527 Final Report PB-202 537

Background

Fundamental theoretical work has been carried out in the field of mathematical models for more than sixty years, as seen in the work of Fischer.[17] However, it is only with the coming-of-age of the high speed computer in the last twenty years that practical solutions of complex equations have been realized. Hence, the mathematical simulation of human body motions has become a very active research topic in the last ten years.

Mathematical models have been developed for the motion of the human body in several environments, including auto occupant dynamics, human gait, and the motions experienced by the legs and arms during walking.[1] This work is often applied to the design, development and use of prosthetic devices.

Generally, two approaches have been used in analyses simulating auto occupant protection. One approach is a relatively simple physical model for studying specific aspects of human kinematics, such as a two-mass, two degree-of-freedom model to simulate belt loadings and head impact velocity in the case of a lap-belted occupant. The second approach involves more complex models of human kinematics utilizing several masses for simulating body motions. In addition, complex vehicle geometry is introduced in these simulations to provide an intricate array of forces acting on the segmented occupant. All these models are marked by extensive development programs requiring at least two years from project initiation to the production of a functioning computer program.

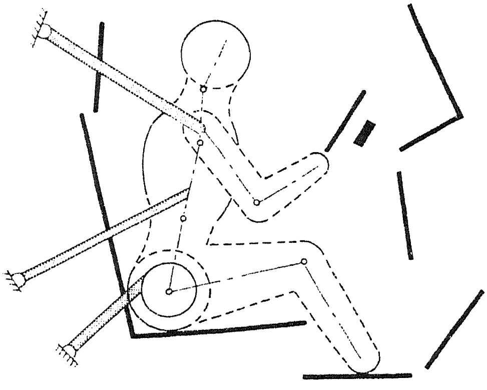
Most of the modeling work mentioned above has been concerned with simulations of occupant motion in two dimensions.

General Comments

The accompanying figure is a schematic of the mathematical model developed under this contract showing occupant, possible contact surfaces, seat, and restraint system.

The three parts of the model are:

- The occupant which is represented by eight mass elements located in the head, upper torso, middle torso, lower torso, upper leg, lower leg, upper arm, and lower arm. Attached to the various body elements are geometric surfaces serving to outline the body in order that contact between the occupant and the interior or exterior of a vehicle can be predicted.
- The vehicle which is represented by a series of planer contact surfaces which can be arranged to represent either a vehicle interior for occupant kinematics studies or the exterior for pedestrian studies. Belt restraints are included if their use is desired.
- The deceleration profile (front-end and rear-end) which when applied to the vehicle results in occupant motions. These motions are outputs of the computer program.



This report also includes a section which serves as a complete Users' Guide for the simulator. Information provided the user includes:

- A discussion of information needed to prepare input data check and techniques used to obtain it
- A discussion of possible outputs from the computer program
- Technical instructions to users familiar with MTS who wish to exercise the model from a teletype terminal
- A description and documentation of the functioning of the computer program
- A description of the program along with a flow diagram
- Techniques for integrating the equations
- Flow diagrams for the individual subroutines.

The comparison of the predictions of the model with experimental impact sled tests are also provided in the report.

CONCLUSIONS AND RECOMMENDATIONS

The contractor feels that the model proposed in this study is a powerful tool for studying and designing advanced integrated seat-restraint systems. It has been exercised several hundred times to study belt restraint systems, various deceleration profiles, headrest and seatback shape, pedestrian kinematics, occupant size and position, etc., and represents the current state of the art in two-dimensional crash victim simulators.

The contractor points out that current state-of-the-art is quite advanced from the viewpoint of producing computer programs which predict vehicle occupant motions in a crash environment. However, considerable research is needed, he feels, to make programs of this nature easily usable. Additionally, he recommends that experimental work accompany the development of future models to make assessment of their validity more straightforward.

The Contract Technical Manager has certified that the contractor's work has been satisfactorily completed and that all contractual obligations have been met.

The opinions, findings, and conclusions expressed in this summary are those of the contractor and not necessarily those of the National Highway Traffic Safety Administration.

Availability: National Technical Information Service (NTIS), Springfield, Va. 22152. Order in paper copy (PC) or microfiche (MF), DOT/HS-800 527

executive summary

SYNOPSIS OF A RECENTLY RELEASED NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION RESEARCH REPOR

DRINKING DRIVER AND TRAFFIC SAFETY PROJECT

ANNUAL REPORT (SECOND YEAR)

The purpose for which this contract was awarded was to develop a probability model of both driving while intoxicated (DWI) recidivism and the accident proneness of DWI offenders to identify convicted drunk drivers who will repeatedly offend and who must be deterred in order to reduce the incidence of accident, injury and death caused by drinking drivers; and similarly, to identify drivers who drink (who may/or may not be convicted drunk drivers) and are likely to kill, injure or damage property while drinking and driving. Further, the contractor was to identify and develop existing innovative countermeasures which will prevent or reduce dangerous drinking driving, to validate the prediction model and to determine the effectiveness of countermeasures.

Contract No. FH-11-7099
University of Southern California
Public Systems Research Institute
University Park
Los Angeles, California 90007
DOT/HS-800 407 Annual Report

Award Amount: $449,382.14
Contract Period:
August 16, 1968
through July 31, 1971

Methodology

The four major studies undertaken to meet the objectives of the project included:

Countermeasures Project

The countermeasures effort of the Drinking Driver and Traffic Safety Project had as its main purpose the testing of various drunk driving recidivism countermeasures currently in use in the United States. At the time of publication of the report, 1,953 convicted drunk drivers had been referred by Los Angeles County Courts to the project over a five-month period. Five separate types of countermeasures were tested: problem-oriented group therapy directed toward discussion and information related to drinking and driving, traditional group therapy related to personal problems and stress factors which affect drinking, film-lecture series emphasizing the role of alcohol in automobile crashes, Alcoholic Rehabilitation Center (ARC) programs utilizing a combination of antabuse programs and film-lecture series, and Alcoholic Anonymous (AA). As part of the research design, two control groups were also drawn from the courts – Control Group I was given an extensive questionnaire and test battery but had no countermeasures treatment; Control Group II was selected from records only and had no contact with the countermeasures project.

Data were obtained by means of a battery of psychological and demographic questionnaires, reports from the California Department of Motor Vehicles and the Bureau of Criminal Identification and Investigation. Analysis of the data continued after publication of the report.

The analysis will be used to determine the type of convicted drunk drivers who respond most readily to each one of the countermeasures, which types of countermeasures are most suited to large groups of drunk drivers, and which particular countermeasures are the most effective in reducing the rate of recidivism.

The Drinking Driver Classification and Prediction Model

The Drinking Driver and Traffic Safety Project has been to develop a mathematical probability model for

1) prediction of potential drunk drivers, and 2) prediction of drunk driving recidivists. This prediction capability was intended for use in Department of Motor Vehicles offices and municipal traffic courts in conjunction with a set of countermeasures, to help deter future drunk driving offenses. Several statistical methods have been utilized to develop a prediction model using data gathered on a sample of licensed drivers never convicted for drunk driving and a sample of convicted drunk drivers.

The initial step in building a prediction capability was the development of a classification model to select a set of variables that would differentiate between sample groups. The second step would be the development of a prediction model after a two-year follow-up study is made of the original samples. The selected set of variables from the classification model will then be used in a predictive sense to differentiate between individuals who have acquired new drunk driving offenses and those who have not. The level of success in this differentiation will determine the usefulness of the prediction model as a decision tool for Department of Motor Vehicles and traffic court officials.

The classification model developed to date indicates that the prediction level for both potential drunk drivers and recidivists will not be maximal. However, even with a limited prediction capability, the contractor believes that the model holds good promise of becoming a useful supplemental tool for decision-makers in helping them select high risk individuals for re-educative and rehabilitative programs.

Comparison of the Convicted Drunk Driver and Deceased Driver Populations

One of the assumptions of the Drinking Driver and Traffic Safety Project is that drinking drivers account for a major identifiable proportion of the fatality and injury producing automobile crashes. This assumption is basic to the study of the convicted drunk driver populations in order to determine how these individuals can be identified in the general population and which countermeasures are most effective in reducing fatal crashes. It is the purpose of the present report to test data on the assumption of similarities between the convicted drunk driver and the deceased driver.

The data to be tested is derived from a sample of fatality drinking and nondrinking drivers randomly selected from all fatality crashes occurring in Los Angeles County during the period, January 1966 - June 1968. These populations are compared to a large drunk driving population drawn from Los Angeles County courts over a five-month period, May 1968 - September 1968, and separated from comparison purposes into those drunk drivers who have a prior crash record and those who have no prior crash record. Further controls utilized are race, age, sex, and for the fatality population, responsibility for the crash and time of death within six hours of the crash.

The analysis of data on all fatality drivers has shown that the prior convicted drunk driver makes up 12 percent of the total fatality population. Further, the fatality drinking driver does not have an extensive alcohol or traffic-related offense record compared with the convicted drunk driver. An exploration of the differences between the fatality drinking driver population and the convicted drunk driver population suggests that the two populations are significantly different in proportion of population with specific traffic and criminal offenses.

Future analysis of data on differences between mean number of offenses within those subpopulations committing specific offenses will give a clearer picture of the differences between the two populations.

Factor Analysis of Fatal Crash Drivers

The objectives of this study were to first, determine the behavioral or situational patterns that exist in the data collected on drivers involved in fatal crashes. Second, compare the behavioral or situational patterns that emerge for deceased drinking drivers and deceased nondrinking drivers to see what similarities and differences in patterns exist between the two groups. Third, make recommendations from these findings as to their possible utility in identifying the characteristics of potentially dangerous and fatal crash drivers and in promoting preventive action.

The deceased drinking driver group (N = 446) and the deceased nondrinking driver group (N = 375) were factor analyzed separately. A third analysis was performed on the combined groups of deceased drivers (N = 821).

A factor analysis was performed on a common set of 45 variables for each group. Four similar patterns for each of the three groups appeared. A preliminary identification of the factors were: (1) criminal record; (2) traffic offense record; (3) older person, older car, and lower occupational status (for the drinking group and combined groups there were the additional variables of higher blood alcohol level at the time of crash and alcoholic violations; and (4) crash liability situation (excessive speed at time of crash, nighttime driving, responsibility for the crash).

The results and their implications are summarized as follows:

The first four factors or patterns that emerged in the factor analysis of fatal crash drivers were very similar for the deceased drinking and the deceased nondrinking driver groups. Apparently, those characteristics identifying both drinker and nondrinker fatality drivers at the time of the fatal crash were similar for both groups. Past history of drinking was not a predominant factor by itself in the analysis, but such drinking did appear as an element in two of the four in the crash liability situation factor.

Fatality drinking and nondrinking drivers who had a criminal record usually had a traffic violation record of some consequence.' In addition, the fatality driver with a criminal record but with no traffic offense record was found less frequently than expected from the pattern of criminal behavior that emerged for both the deceased drinking and deceased nondrinking groups.

The older, lower socioeconomic status person who drove an older car was found with relatively high frequency in the deceased nondrinking driver population, even though he might have had no violation record. However, the older, lower socioeconomic status person who also had a criminal record or a traffic violation record did not appear in the fatal crash frequency population as frequently as might be expected by chance alone. Apparently, the effect of having been picked up for criminal offenses or traffic violations reduced the likelihood of this person becoming involved in a later fatal crash. This lowered likelihood may be due to a number of factors following his arrest and conviction: time in custody preventing driving, court restriction or prohibition of his driving, or simply his later more careful driving. Restrictive controls imposed on this "older person - older car" type of individual who acquires a significant criminal and traffic record would have little effect on the overall fatality rate because this class of individuals appeared to be under-represented in the fatal crash population of this study.

The habitual traffic violator without a criminal record did not become involved in fatal crashes as frequently as might be expected by chance. When the habitual traffic violator also had a criminal record, however, the likelihood of this class of individuals becoming involved in a fatal crash increases. Apparently, traffic violators who also have an antisocial attitude, as evidenced by a criminal record, demonstrate a greater predisposition toward fatal crashes.

contractor's work has been satisfactorily completed and that all contractual obligations have been met for the second phase of this contract.

The opinions, findings, and conclusions expressed in this summary are those of the contractor and not necessarily those of the National Highway Traffic Safety Administration.

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